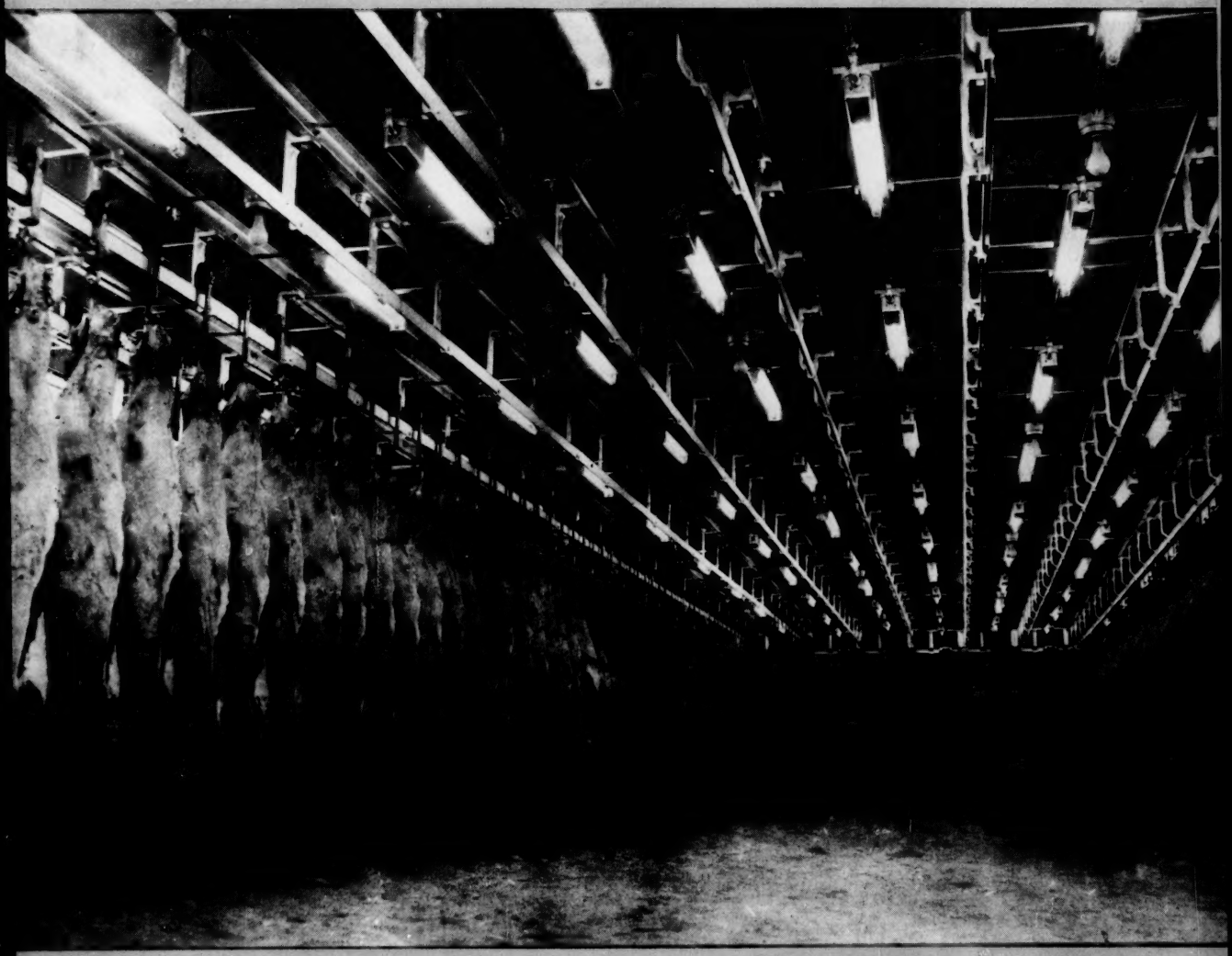
INDUSTRIAL REFRIGERATION



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VOLUME 130
NUMBER 1

JANUARY, 1956

"WE'VE FOUND THE KEY TO TOP COMPRESSOR PERFORMANCE" —reports Utah Ice & Storage Company

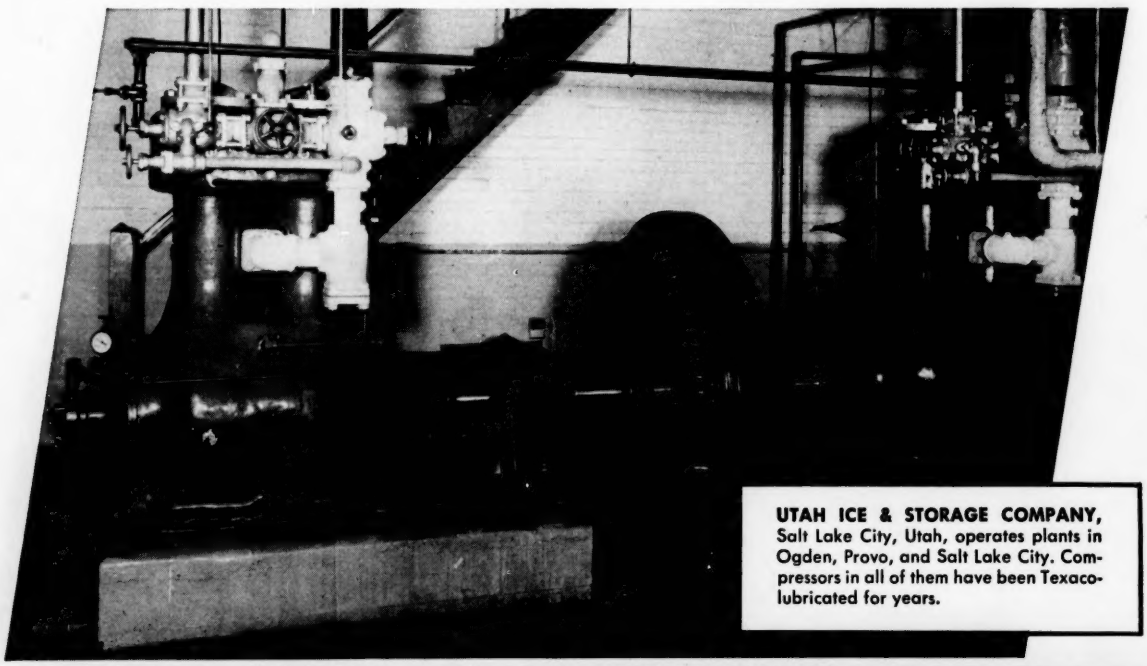
"IN ALL the years we've used *Texaco Capella Oil* for our refrigeration compressors," the report says, "performance has been consistently dependable. Systems stay clean, valves and other vital parts function smoothly. The over-all results — efficient refrigeration, low maintenance expense."

You, too, can enjoy these same benefits. *Texaco Capella Oil (Waxfree)*, for example, will not wax out in systems even down to minus 100 degrees F. It exceeds the requirements of the Freon floc test as well as the specifications of all leading refrigeration manufacturers. *Texaco Capella Oil (Waxfree)* retains its stability under the most severe conditions and effectively resists oxidation. It does not foam, is free from moisture and is compatible with all lubricants.

There is a complete line of *Texaco Capella Oils (Waxfree)* to meet every compressor requirement. Available in 55-gallon and 5-gallon drums, 1-gallon cans, and the more widely used grades in 1-quart containers — all refinery-sealed to protect purity and quality.

For expert advice on any compressor lubricating problem, consult a Texaco Lubrication Engineer. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York.



UTAH ICE & STORAGE COMPANY, Salt Lake City, Utah, operates plants in Ogden, Provo, and Salt Lake City. Compressors in all of them have been Texaco-lubricated for years.

TEXACO

TEXACO Capella Oils (Waxfree)

FOR ALL REFRIGERATING AND AIR CONDITIONING COMPRESSORS

TUNE IN: TEXACO STAR THEATER starring JIMMY DURANTE on TV Sat. nights. METROPOLITAN OPERA radio broadcasts Sat. afternoons.

VESTIBULE TYPE TRACK DOOR
FOR EMPERATURES
50 TO 20

YEARS OF SATISFACTION

"Butcher Boy"

Quality Since 1885

WHY "BUTCHER BOY" DOORS ARE THE FINEST REFRIGERATOR DOORS BUILT!

These Exclusive Features Furnished At No Extra Cost

DOOR STRUCTURE

New "X-Type" Diagonal bracing.
"INTERLOK" No-Sag Corner Construction.
Permits maximum insulation fill inside of door.

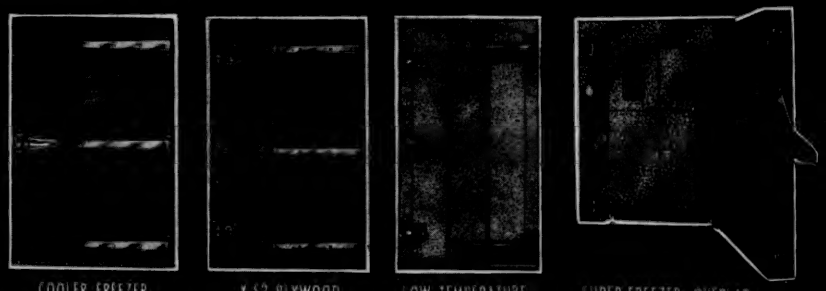
HARDWARE

20% to 150% more metal in vital areas.
Alemite fittings for convenient lubrication.
Sanitary, all working parts enclosed.

APPEARANCE

Massive ⅞" thick SOLID Douglas Fir front.
Vertical specially milled alternating panels.
Modern and more durable hardware applications to match doors.

When a Man Thinks Twice ...He Makes Comparisons



COOLER FREEZER
50 TO 30

X-52 PLYWOOD
50 TO 10

LOW TEMPERATURE
10 TO 20

SUPER FREEZER OVERLAP
0 TO 100

BUTCHER BOY REFRIGERATOR DOOR CO. HARVARD, ILLINOIS

STAND-OUT

Antibiotic Ice For Fish

AUREOMYCIN in ice may help bring fresh-caught fish to the New York market from the Pacific Northwest. Successful experience with the new method of extending the market range of fresh caught fish was reported at a meeting of the Gulf and Carribean Fisheries Institute by technologists of the Fine Chemicals division, American Cyanamid Co.

King Salmon and halibut caught at Neah Bay in the State of Washington were eviscerated, packed in ice, trucked to Seattle and shipped East by rail through regular commercial channels which afforded only one reicing on the sixth day of the journey. The salmon packed in ice containing five parts per million of Aureomycin chlortetracyeline were fresh, sweet and uniformly pink on its arrival at the American Cyanamid food technology laboratories at Princeton, N. J., 13 days later, and the halibut were firm.

Both the salmon and halibut remained marketable until the 20th day, or one week after reaching the East. Accompanying shipments of salmon and halibut packed in ordinary ice arrived with up to 300 times as many bacteria per gram and were unsaleable on arrival, it was said.

In tests on different species, the investigators found that bacterial counts were held to the lowest levels when an Aureomycin dip was followed by packing in Aureomycin ice. All three methods permit fish flesh to take up minute quantities of the protective Aureomycin, but the highest levels found in the tests reported were five parts of the antibiotic per million parts of fish flesh, and most fish retained appreciably less.

Use of the antibiotic to kill bacteria causing food spoilage was approved by the Pure Food and Drug Administration in Washington. The process and the antibiotic in its commercial form both are known as "Acronize."

Dr. Hugh L. A. Tarr of the Canadian Fisheries Experimental Station, Vancouver, B.C., assisted in development of the process, which also is useful for preservation of poultry and beef. The dilute applications of the antibiotic are harmless if eaten, Dr. Tarr said, and in any event are eliminated by cooking.

Industrial Refrigeration

formerly ICE AND REFRIGERATION
Now in its 64th Year of Publication
J. F. NICKERSON, FOUNDER

Vol. 130 | January, 1956 | Number 1

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The Cover:

Those rows of overhead lights in this 7,000-square-foot room are not to see by, but are ultra-violet lamps used in the Tenderay process for aging and tenderizing meat. A picture of storage room at Bohacks, large Brooklyn and Long Island food chain. Eighteen carloads of beef, or some 400,000 pounds can be hung in this room. The ultraviolet lamps used here do not tenderize the meat themselves, but they keep the atmosphere free of bacteria and mold spores and make it possible to hang meat in a warmer room and speed up the natural tendering process as much as twelve times. The Tenderay process was developed by the lamp division of the Westinghouse Electric Corporation, manufacturers of the Sterilamp ultra-violet lamp, aided by the Mellon Institute, Pittsburgh, Pa.

Published Monthly by NICKERSON & COLLINS CO.
General Offices: 433 N. Waller Ave., Chicago 44, Ill. Telephones: AUstin 7-1303-04-05

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INDUSTRIAL REFRIGERATION, Vol. 130, No. 1. Published monthly at 433 N. Waller Ave., Chicago, Ill., U.S.A., by Nickerson & Collins Co. Yearly subscription in the U. S., $2.00 per year; other countries, $3.00. Single copies, 25 cents.

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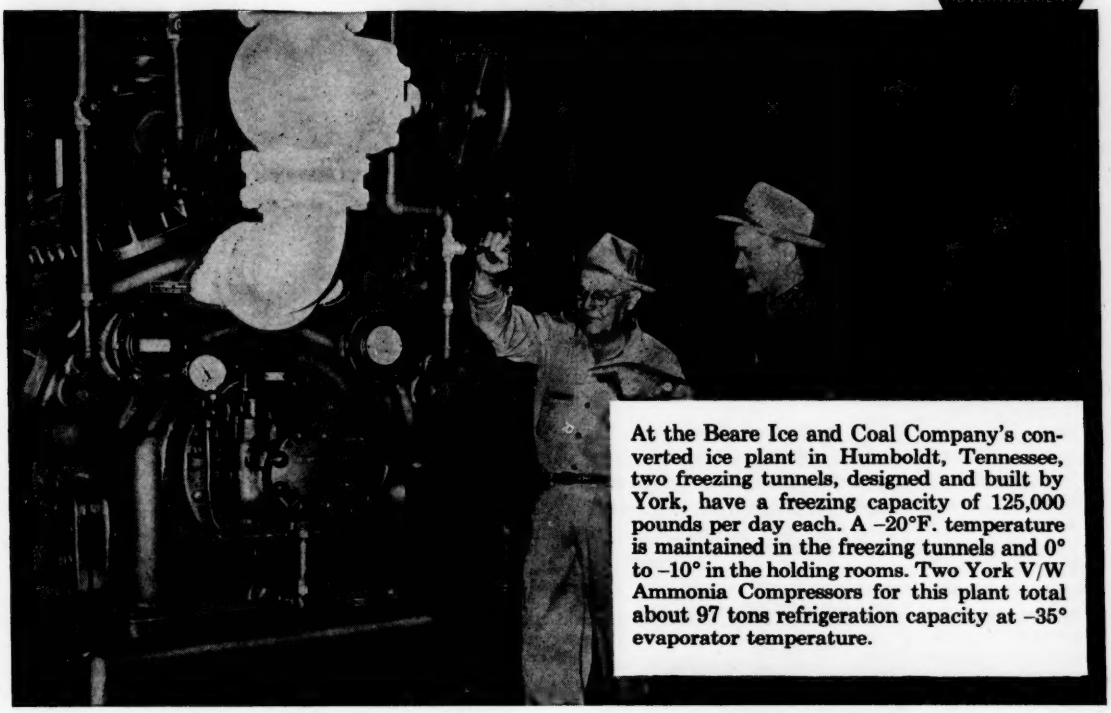
Industrial Refrigeration is indexed regularly by Engineering Index, Inc., and is microfilmed for library use by University Microfilms.

NEW facts for your files on York V/W Ammonia Compressors for

Quick Freezing Plants

INFORMATION ADVERTISEMENT



At the Beare Ice and Coal Company's converted ice plant in Humboldt, Tennessee, two freezing tunnels, designed and built by York, have a freezing capacity of 125,000 pounds per day each. A –20°F. temperature is maintained in the freezing tunnels and 0° to –10° in the holding rooms. Two York V/W Ammonia Compressors for this plant total about 97 tons refrigeration capacity at –35° evaporator temperature.

FREEZING ROOMS CAN DOUBLE AS HOLDING ROOMS—and refrigerating equipment must fill each need economically. York V/W Refrigerating Compressors offer outstanding flexibility of operation for greater economy.

BIG POWER SAVINGS—Starting power requirements are reduced because compressor starts unloaded. Automatic or manual control of cylinder unloaders provides extreme flexibility. This permits selecting most economical stage of operating capacity to balance changing plant loads. Power requirements are reduced in almost direct proportion to load reductions—28% power at 25% load, for example.

EASY INSTALLATION—Compact, lightweight, balanced design of York V/W Refrigerating Compressors eliminates need for special foundation (requires only a level floor). Freedom from vibration permits upper floor installations.

ENGINEERING SERVICE—York's vast experience in the freezing and storage of foods is part of a *complete* York service available to your design engineer.

Some Helpful Hints for Quick Freeze Men

1. To speed merchandise handling and reduce the loss of refrigerated air from freezing areas, provide pull cords which fork lift truck operators can reach from their seats and which automatically open and close the cold storage doors. Platforms should be designed with sufficient width (approximately 20 ft.) to permit such operation.

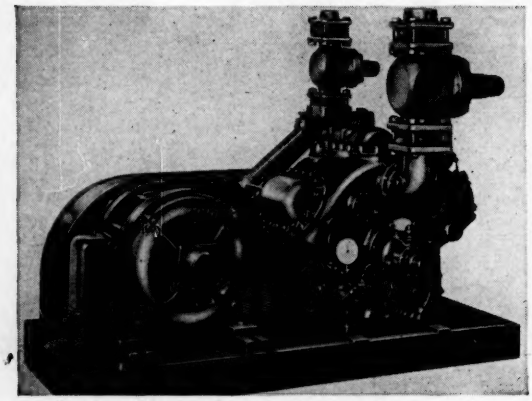
2. To assure proper air circulation and uniform low temperatures of frozen foods in cold storage areas, provide air circulation space between pallets and packages and keep packages from contacting walls.

3. Heating coils installed in the lower slab of a concrete floor will prevent frost heaving in freezing and food storage areas. Coils should be kept at approximately 50°F. with automatic thermocouples to control temperatures.

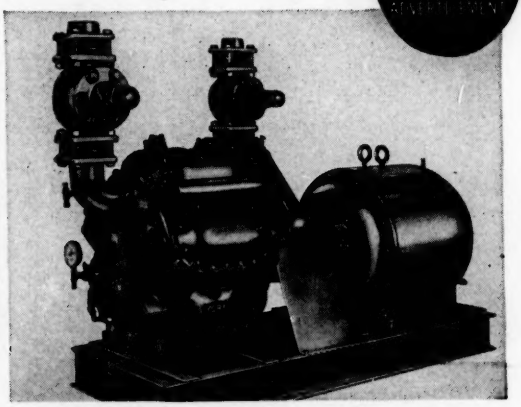
AIA FILE NO. 34-H-3

CUT OUT AND FILE SEND FOR FREE FILE FOLDER AND REPRINTS SEE OTHER SIDE

YORK V/W AMMONIA COMPRESSORS



4-cylinder V/W Ammonia Compressor (Belt Drive)



8-cylinder V/W Ammonia Compressor (Direct Drive)

York V/W Compressors bring great flexibility of operation to quick freezing plants. Their ability to operate at various stages of capacity realizes important savings on operating costs during off-season periods (when loads are light) and when freezing rooms double as holding rooms (with different temperature requirements for each duty).

TYPICAL DIMENSIONS

V/W—BELT DRIVE—3¾" x 3 "	V/W—DIRECT CONNECTED—3¾" x 3"
Length 69"—76" *(Including motor and depending on model)* Width 39¼"—45" Height 46½"—48½"	Length 75¼"—105 7/16" *(Including motor and depending on model)* Width 30½"—38⅜" Height 48 11/16"—57⅛"

PRINCIPAL FEATURES

FLEXIBILITY OF OPERATION—York V/W Compressors offer various stages of capacity reduction through automatic or manual unloading for greater flexibility of operation. An 8-cylinder V/W Compressor, for example, has 4 stages of capacity reduction.

EASY MAINTENANCE—All wearable parts—including cylinder liners, valves, bearings, oil pumps and unloader power units—can be easily removed and replaced when worn. Thus, prolonged and expensive shutdowns can be avoided, and original operating efficiency is maintained. IT *CAN'T* WEAR OUT.

EASY INSTALLATION—Compact size, extremely low weight per cooling unit and vibration-free operation minimize space requirements and permit easy installation. Even upper floor installations are possible without special foundations.

OPERATION

York V/W Compressors give efficient use as single units in refrigeration systems up to 300 tons capacity and where evaporator temperatures are above –20°F. In quick freezing plants with evaporator temperatures running to –20°F. and lower, it is recommended that a compound compression system be installed with a York Booster Compressor acting as the low-stage compressor. This type of installation will usually justify itself through reduced operating expense and first cost of equipment.

SPECIFICATIONS—STANDARD UNIT

CAPACITY—5 to 300 tons capacity in a single unit.

CYLINDERS—4, 6, 8, 12, or 16 cylinders (depending on model), and arranged in a V, W or VV.

HOUSING—Close grain iron casting with removable cast alloy iron sleeves fitted into cylinders.

CAPACITY REDUCERS—Capacity reducers, including necessary steel tubing orifices and hand-operated stop valves are furnished as standard equipment. Automatic capacity reduction extra.

LUBRICATION—Pressure lubrication for all bearing surfaces from a single pump geared to crankshaft.

SHAFT SEAL—Positive packless type under continuous oil head. Refrigerant can't leak out—air can't leak in. Friction wear at a minimum.

York Corporation, York, Pa.

YORK CORPORATION

the quality name in air conditioning and refrigeration

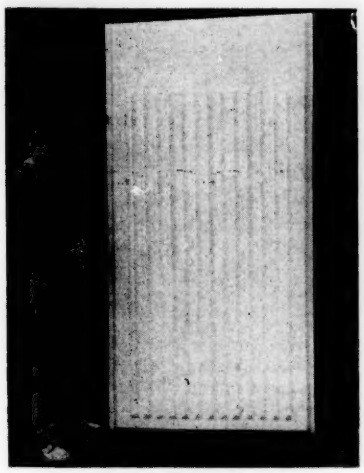
HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

What's New

MACHINERY
APPLIANCES • PROCESSES

New Plastic Door Pan For Refrigerator Doors

A PLASTIC door pan for refrigerated doors is now offered by Strick Plastics Corporation, Philadelphia, Pa. Made of a reinforced fiberglass called "Lamicor", the door pan has been proved more than strong by over five years of use in refrigerated truck trailers, as well as in standard commercial refrigerators. Moisture-resistant and corrosion-free, the Lamicor door pan does not warp or swell when effected by extremes of temperature.

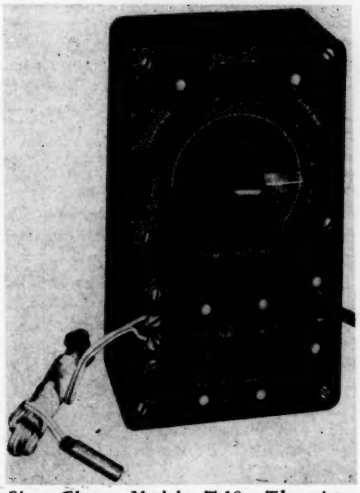


Lamicor Door Pan ready to install

Easy to clean as a sheet of glass, the door pan can even be sterilized with a steam jenny. It does not absorb odors emitted by stale crusts of meat, milk or chemicals and resists penetration by most acids and alkalis. Bearing unusual insulating properties to aid in bringing refrigeration costs down, the door pan also helps the refrigerator eliminate leaks by avoiding all metal to metal contact with the door frame. Suitable for new doors as well as a replacement in existing doors that are warped or damaged, the Lamicor door pan comes in sizes up to 88-¼ inches high.

Temperature Indicating Bridge Announced

ADDITION of a new Thermistor Temperature Measuring Bridge to the line of SIGNA-GLOW Test Instruments is announced by Industrial Development Laboratories, Inc. Jersey City, New Jersey. This new instrument, Signa-Glow Model T-10, covers the wide range of minus 60 C to plus 60 C (minus 70 F to plus 140 F) with an easy-to-read, 2-color scale which is over 5 inches long and calibrated in both Fahrenheit and Centigrade. The unit is designed with a single indicator dial and a Thermistor Type sensing probe.



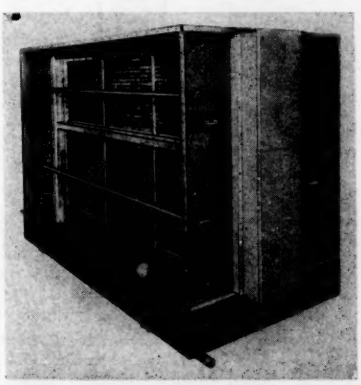
Signa-Glow Model T-10 Thermistor Temperature Measuring Bridge

It uses no batteries and can be connected to a 115 V, 60 Cycle outlet.

Signa-Glow Model T-10 is a self-contained unit housed in a phenolic case 3-¾ x 6 x 2 inches and weighs under 2 lbs. A leather carrying case and other useful accessories are available. It incorporates the new (pat. pending) Signa-Glow Null Indicator, which consists of a pair of miniature Glow Lamps which show, at a glance, both the degree and direction of unbalance. Rugged construction permits severe vibration and rough handling without impairment of calibration or function of the instrument.

New Sprayed Coil Dehumidifiers

A NEW line of central station type sprayed coil dehumidifiers which feature heavy construction, complete accessibility and ease of maintenance is available from American Blower Corporation, Detroit, Mich.



New Central station type sprayed coil dehumidifier offered by American Blower Corp.

A special access door on the air-output end of the new dehumidifier provides quick access to coils, drain trough and tank in that area. Coils themselves are removable from the unit either from the connection box side or from the air-intake or air-output end of the unit. The eliminators are also removable. Spray nozzles, float valve, strainer, coil face, drain troughs and tank are accessible through the air-inlet end of the dehumidifier.

The new units are available in standard arrangements having 1, 2 or 3 coils high and from 4 to 8 coil rows deep. Finned tube length can vary from 2 ft to 10 ft; coil face area from 4 sq ft to 83 sq ft; and capacity from 2,300 cfm up to 45,900 cfm. Recirculated spray water requirements range from 5 gpm for the smallest unit in the new line to 84 gpm for the largest.

Face and by-pass dampers are available as an optional accessory which is mounted in a frame for bolting to the unit's air-output face. A by-pass section of 18 gauge galvanized steel is furnished with the dampers.

New High Pressure Y-Type Pipe Strainers

DEVELOPMENT of six sizes of carbon moly steel strainers in addition to its present line of cast semi-steel strainers is announced by Armstrong Machine Works, Three Rivers, Mich. The new Y-type pipe strainers for oil, gas, air, water and steam lines are suitable for pressures to 900 lbs. and temperatures to 900 F. Maximum pressure at 100 F is 1800 psig.

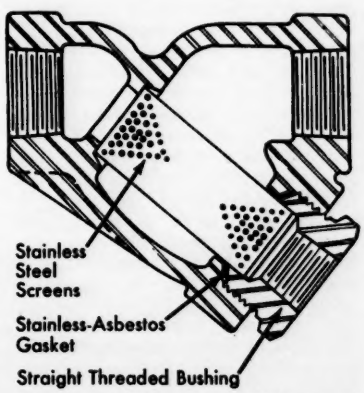


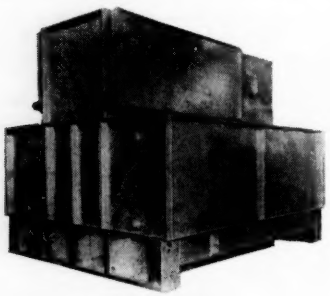
Diagram of high pressure high temperature Y-type pipe strainer.

The strainers are available in ½ through 2 inch sizes, either screwed or socket weld. Sizes 1 ¼, 1 ½ and 2 inches have bolted retainer plates. Smaller sizes have straight thread screwed bushings. Stainless steel screens are standard, either .045 inch diameter holes, 226 per sq. in. or 24 x 110 wire mesh. Other screening material is available to meet most requirements.

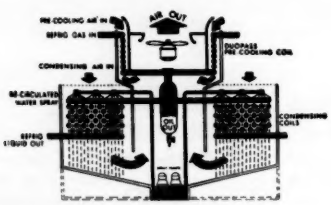
Design features include a stainless-asbestos gasket which is locked in between the body and the base of the bushing thus eliminating any chance of blowout.

New Design Evaporative Type Condenser

A RADICALLY new design, evaporative-type refrigerant condenser in capacities ranging up to 240-ton ammonia refrigeration is announced by the Niagara Blower Company. The refrigerant is condensed in two parellel mounted coils enclosing a central plenum under the fan section. Water sprays are arranged over the coils and the air enters from above, travels downward and changes direction to enter the plenum, at which point the entrained water is eliminated. The air then moves up and out through propeller fans.



FLOW DIAGRAM



Niagara Sectional Condenser

The hot gas is sub-cooled before condensation by first passing through duo-pass pre-cooling coils mounted beside the fan section. A dry air stream crosses this coil, removing the super-heat. Any oil vapor present is liquefied during this process and removed by the "Oilout" separator in the gas line ahead of the condensing coils. This pre-cooling also prevents the high-temperature deposit of hard scale on the condensing coils. The only water consumed is that evaporated. Unrestricted down-draft air instantly removes the excess water from the condensing coils, improving the heat transfer from the refrigerant gas to the air stream. The excess water is recirculated.

All sections of the Condenser are encased in separately removable panels for complete accessibility for painting or to allow the coils to be cleaned from any side. Removing a single panel gives entrance to the central plenum and puts all interior parts within reach. Much expense is saved to the owner by the design which permits shipment of the casing as flat panels rather than box-like shapes.

There are four sizes: 90 tons, 120 tons, 180 tons and 240 tons. The ratings are for ammonia; the condensers are also applicable to freon. The dimensions of the largest size are approximately: length 13 feet, width 16 feet, height 10½ feet.

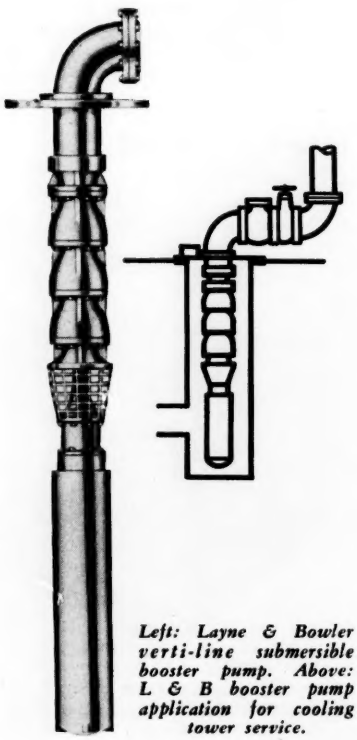
New Submersible Booster Pump

THE technical skills and experience of two companies, Layne & Bowler Pump Company of Los Angeles and General Electric, both leaders in their respective fields, have joined in producing the "Verti-Line Submersible Booster Pump" designed specifically to meet the rigid requirements of industrial and municipal pump users.

The submersible type pump has been designed for industrial applications by Layne & Bowler Pump Company to provide invisible and noiseless operation, greater safety for both people and equipment, extra dependability in any weather, minimum space requirements, and virtually maintenance-free performance without need of adjustment or lubrication.

In order to meet the varied demands of industrial application, the Verti-Line Submersible Booster Pump embodies many refinements such as: oversize shaft, longer bearings with protective caps, perihedral impeller seals, mechanical shaft seal designed specifically for submerged service, and a choice of either mixed-flow or radial-flow impellers. The General Electric Submersible Motor has a larger oil reservoir and a spring-loaded resilient bag which permits the sealed motor to breathe with changing pressures and temperatures.

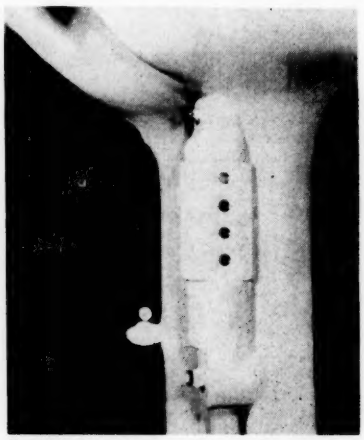
Most Verti-Line submersible Booster Pumps are factory assembled units, adjusted and tested for optimum performance, so that the equipment is ready for use upon installation without venting, filling, adjustment or alignment. Standard models available from 5 to 150 hp, with discharge head 50 to 500 feet and 100 to 4,000 gpm capacity.



Left: Layne & Bowler verti-line submersible booster pump. Above: L & B booster pump application for cooling tower service.

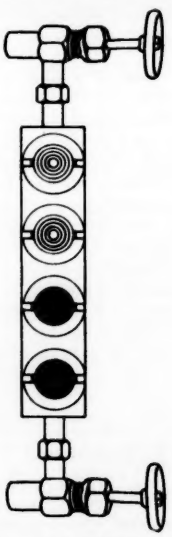
Level-Eyes Show Liquid Level in Accumulator

A NEW low temperature gauge column for refrigeration systems has been announced. The column is made up of a series of Phillips "Level-Eyes" which will not frost over or become fouled by oil or dirt. Liquid behind these unique bullseyes appears black, the absence of liquid leaves the glass clear. Boiling liquid does not affect the reading.



Installation of "Level-Eyes" on an accumulator in a Chicago cold storage plant.

According to the manufacturer, besides its frost-free readability feature, the column is compact and easy to insulate. Only the "Level Eyes" must be left uncovered. A transparent plastic "Frost Shield" may be inserted over the "Level Eyes" for very low temperature use. The column is suitable for use between minus 50 F. and 250 F. and at working pressures to 300 psig. It can be supplied at any practical length with "Level-Eyes" spaced as close as every 2-in. It is furnished complete with shut-off valves and ½-in. ball check valves.



Four eyes on this Phillips "Level-Eye" gauge column show liquid level below the clear, but above the black eyes.

Five Ton Production Coil for Large Installations

Largest production coil of its kind, new Recold 5-ton flooded ammonia ceiling blower coil, is checked out by three who played important part in development. Pictured at Refrigeration Engineering, Inc., plant, Los Angeles, are: left to right, David Tomblin, chief draftsman; Bob Adachi, development engineer; Dan D. Wile, chief engineer. This giant coil has capacity of 60,000 Btu @ 10° TD and air volume of 11,000 Cfm. Made especially for large installations it was developed by Refrigeration Engineering, Inc., from demand created by Recold 3-ton coil used for freezer applications and storage area.

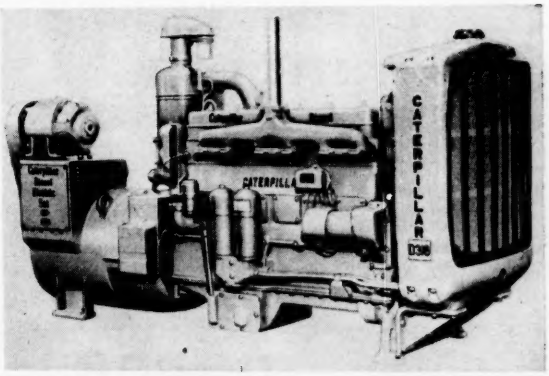
New Diesel Electric Sets

FIRST of a completely new line of diesel electric sets has been announced by Caterpillar Tractor Co. Combining the latest developments in design, materials and construction, the new self-regulated generator sets have the same desirable characteristics of externally-regulated sets and also maintain the simplicity of operation and motor starting ability of former model self-regulated units.

Introducing another new concept in diesel-electric power, Caterpillar has perfected a new and better generator. Each Cat Generator is now designed and built to match the Cat Engine powering it which assures maximum dependability in a simple, complete package. The new self-regulated units are designed to meet the needs of applications now served by self-regulated or externally-regulated generators. Featuring close voltage regulation, they provide steady voltage from no load to full load.

During initial installation of these new units, the "terminal" voltage and voltage "droop" can be adjusted to meet the special conditions of the particular application. After that, the adjustments are locked and no further adjustments are necessary. The new self-regulated power plants are easy to install as no complicated switchgear or external voltage regulators are needed. The new units can be easily paralleled with most generators of any type or make now in use.

Caterpillar designers have taken full advantage of new materials that have been developed with the result that the new Caterpillar Generators are much smaller in size and more compact than previous models. The new generators were designed to save space. Leads can be taken from the side, back or top



Caterpillar D318 Diesel Electric set featuring the new Caterpillar-built self-regulating generator

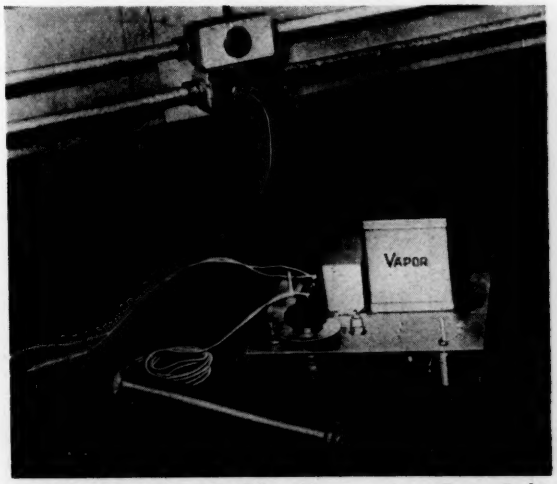
Vapor Magnetic Temperature Control

A NEW type temperature control for railroad refrigerator cars using a magnetic amplifier instead of electronic tubes which are not able to stand the jolt and vibration of railroad use has been developed by the Vapor Heating Corp. Chicago.

This new temperature control has an adjustable temperature setting which can be changed from minus 10 to plus 70 degrees F by turning the temperature selector on the panel. It is designed to control the different types of mechanical cooling and heating system now used by the railroads.

The temperature sensing element in the end of the brass tube (see picture) is installed in a cooling air duct in the body of the car. It is a vapor thermistor thermostat and is sensitive to small temperature changes. The magnetic amplifier enlarges the small electrical current from the thermistor so the control will cause the cooling system to increase or decrease cooling output or heat the car as needed to keep the car within 1½ degrees of the predetermined temperature setting.

The control is mounted on a 7½ × 9 inch cadmium plated metal base to fit into the electrical panel of the mechanical refrigerating systems. It is put into operation by connecting to the 220AC current from the system and making connections to the heating and cooling contacts on the control. The ability of the control to withstand rugged shocks and hold an accurate temperature setting, no vacuum tubes to warm up or moving parts to wear out, are the outstanding features.



Vapor Magnetic Amplifier Temperature Control for Refrigerator Cars made by Vapor Heating Corp.

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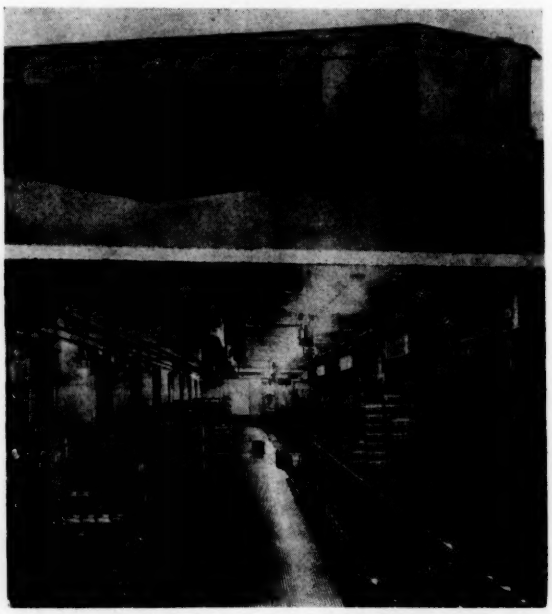
Steel Refrigerator For Retail Milk Routes

A NEW milk route distribution technique has been developed for Beatrice Foods which eliminates the need for a regular plant load-out crew. A steel refrigerator and a chain type conveyor, as shown in the illustration were engineered by Moore & Hanks Company and the Mojonnier Bros. Co. of Chicago working with several leading milk distributors. The cold room pictured provides for 66 retail routes, three behind each of the 22 sliding doors.



Exterior and interior of City Park Farm in Denver. Above: steel refrigerator used for milk delivery routes. Below: Chain conveyor system for assembling orders.

The complete order for each driver is prepared by the regular milk plant crew the night before. It is conveyed to its proper load-out position by means of specially engineered Mojonnier chain-type conveyor. The room is equipped with 22 special "Jam Lok" sliding steel doors. In the early morning the driver opens the sliding steel door behind which his order is located and loads it directly into his retail truck.

The cold room pictured is 25 × 90 × 11 ft. high and is composed entirely of insulated steel panel sections. This steel refrigerator building may be expanded to accommodate additional retail routes by merely adding more of the standard steel insulated panel sections and sliding doors.

The insulated steel panel sections are virtually indestructible and are designed for a lifetime of all-weather service. Sectional Thermo-cell steel construction also makes it possible to move the entire operation to a new location in a matter of days. This specially designed building is now available in all sizes.

Metallic Zinc Coating

A METALLIC zinc coating as a method of preventing corrosion on steel sheets and beams has been accepted for years by builders and engineers as the best corrosion protective coating, not only because of its mechanical strength but because of its galvanic action in the protection of iron. Actual galvanizing can only be supplied through an electrolytic dip tank and is therefore limited to moveable parts of dipping size.

The Wilbur & Williams Company has devised a 95 percent pure zinc coating which is applicable with a brush or spray gun to standing structural parts, for the purpose of renewing galvanizing on parts that have lost the original protective coating or of applying a zinc protection to standing towers, fences or air conditioning ducts which being already in position could not otherwise be zinc coated.

PRESS BRIEFS

Carrier-York Litigation Settled

THE patent litigation instituted by Carrier Corporation of Syracuse, New York, against York Corporation of York, Pennsylvania, and a customer of York in Greensboro, North Carolina, has been settled amicably to the satisfaction of both parties. This was announced by Cloud Wampler and Stewart E. Lauer, the chief executive officers of the two air conditioning companies.

The suit against York was for infringement of a patent fundamental to the Carrier Conduit Weathermaster System. This system has been installed in over 350 large buildings, both in this country and abroad. It virtually eliminates the need for large ducts, the conditioned air being supplied through relatively small conduits or pipes to individual rooms. A small unit in each room utilizes induction to form a final air supply of the desired temperature and humidity content as required to meet the needs and individual preferences of the occupants during all seasons of the year.

Under the terms of the out-of-court settlement royalties will be paid to Carrier by York on both past and future installations. Also, York has been granted by Carrier a license under various specified patent rights relating to the Carrier Conduit Weathermaster System. In addition, York received a license for Canada and certain foreign countries where Carrier owns corresponding patent rights.

In announcing the settlement Messrs. Wampler and Lauer said: "The arrangement that has been made will result in substantial benefits to the public, as well as to our respective corporations and their stockholders. Carrier and York compete vigorously with respect to large air conditioning installations and with the end of this patent suit the market for the highly-efficient and economical induction system should expand appreciably. And this expansion should result in lower prices to users."

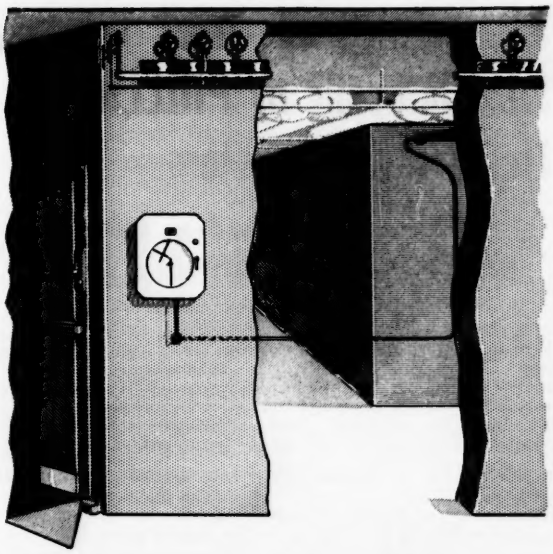
Minute Maid Registers Stock Offering

THE MINUTE Maid Corp., frozen food producer, has registered a 400,000-share issue (about $6,800,000) of common stock with the Securities and Exchange Commission. The 10 percent par value stock will be offered by a group headed jointly by Paine, Webber, Jackson & Curtis and White, Weld & Co., Price will hinge upon over-the-counter value of the stock at the time of offering. It's currently quoted at $17 bid.

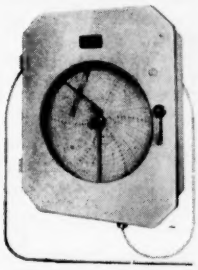
Proceeds will go for working capital, need for which is greater since the company acquired Snow Crop Corp. last year. In the past such requirements were met mainly by seasonal loans from banks. The company plans to seek new York Stock Exchange listing for the stock "in the next several months."

New Frozen Food Plant

CONSTRUCTION at Cleveland, Ohio of an ultra-modern frozen food processing plant has been announced by the Stouffer Corporation. The new plant at 3800 Woodlawn Avenue, S. W. will have eight times the producing capacity of the present plant and will cost about $1,350,000. It is being built by the Northern Ohio Food Terminal to meet specific needs of Stouffer, which will have use of the building on a long term lease. Architects and builders are Gilmore-Olsen Company.



Witness for the PROTECTION . . .



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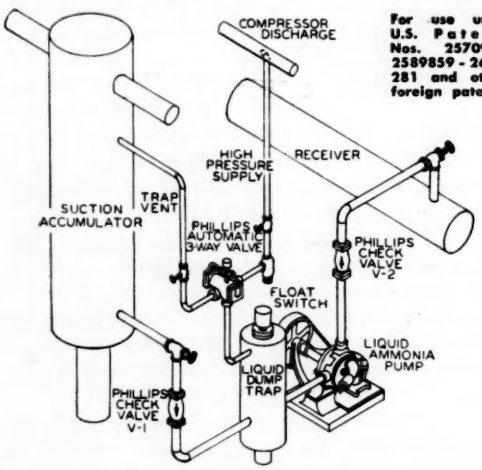
Ammonia "Slop-Over" Handled Automatically by PHILLIPS Liquid Return System

Protects Compressors, Saves Power, Makes Defrosting and Maintenance Simpler

Even in the best designed refrigeration systems, ammonia "slop-over" is a common occurrence. Two stage compression systems, booster systems and control ammonia compression systems subject to fast temperature and pressure changes are especially likely to have liquid in suction lines. This condition can seriously damage compressors which should handle dry gasses only.

Engineers at H. A. Phillips & Co. have devised a system that automatically returns "slop-over" directly to the receiver without regenerating and re-condensing the liquid. As shown in the drawing below, the Phillips Liquid Return System takes liquid ammonia which has collected in the accumulator, drains it through an outlet valve and check valve (V-1) into a liquid trap. Drainage occurs when the trap is at a low pressure. The trap is vented to the accumulator through a three-way valve and vent line. As the trap fills, a float switch is activated, energizing a three-way valve. This valve closes the vent line and connects the compressor discharge to the trap. Pressure builds up in the trap and closes check valve V-1. Pressure in the trap then reaches the same pressure as the receiver, opening check valve V-2 and allowing gravity to carry the liquid to the receiver. If gravity flow is not possible, a liquid ammonia pump is used. High pressure at both the pump inlet and outlet prevents flashing the liquid into gas. When the liquid trap is empty, the three-way valve is de-energized, closing the high pressure line to the trap. The trap is again vented to the accumulator, allowing liquid to drain once again into the trap.



For use under U.S. Patents Nos. 2570979-2589859 - 2641-281 and other foreign patents.

Phillips Liquid Return System

This arrangement is highly efficient since only one pound of compression gas is required to move 25 pounds of liquid. There is practically no loss of refrigeration potential of the recovered liquid. The system also permits oil flushed into the accumulator to be easily drained.

A number of "packaged" variations of this system in capacities to 1000-tons are available to handle all arrangements of accumulator and receiver locations. For full details, write . . .

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Port of Seattle Closes Bell Street Terminal Cold Storage Facilities

PORT OF SEATTLE cold storage facilities are scheduled for far-reaching changes in 1956. As part of the program the 646,000 cubic feet of cold storage space at Bell Street Terminal probably will go out of operation and the Port's cold storage will be centralized at the Spokane Street warehouse.

The Port Commission ordered first steps toward closing of the terminal in December. Commissioners instructed Port General Manager Howard M. Burke to report on when cold storage at Bell Street will reach its low point next year and the operation can be closed out most conveniently. By February or March it is expected, only a smattering of fisheries products will be left there.

Burke told the commission his staff should be able to report back with specific recommendations before the year ended. If closure is ordered, Burke said, the port will give tenants all possible notice and will try to provide space for them in port cold storage operations at the Spokane Street Terminal.

Port Commissioners acted after a report from Controller John McCutcheon showed a $28,000 loss from Bell Street cold storage operations in the first nine months of the year. Last year at the same time the loss was $18,300.

Two years ago these facilities were saved after tenants protested that closure would doom Seattle's big mild-cured salmon industry. Much of this business, commissioners now think, could be handled at Spokane Street.

This year too, commissioners seem determined to follow through on the closure and shunt mild-cured salmon to other local facilities. Two of the three commissioners spoke out vigorously against continued loss on the operation.

Valuable Cattle Vaccine Saved by Dry Ice

A CARGO of foot-and-mouth disease vaccine which was feared to have been destroyed by over-heating when an aircraft in which it was being flown from Europe to Nairobi was delayed at Khartoum, arrived safety at Eastleigh Airport. Valued at £6,000, the consignment would have been ruined by a temperature increase of one or two degrees. On board the aircraft was a senior veterinary research officer, Mr. Burdin, who told how he saved the vaccine by periodically placing dry ice, flown from Niarobi, in each container.

When the aircraft landed at Eastleigh, Veterinary Department officials were waiting to rush 150,000 doses of the vaccine to farms in all part of Kenya who were waiting it to help combat outbreaks. In view of the experiences of Mr. Burdin in Khartoum, the Department is now drawing up detailed instructions to air companies on action to take in the event of any further delays. These will include the names of places where dry ice is available and advice on how to add dry ice to the vaccine containers.

Apple Packing Plant Adds Storage Space

THE addition of some 30,000 cubic feet of cold storage space, about 12,000-box capacity, brings to a total approximately 85,000 the capacity of cold storage available at the O. F. Erbes apple-packing plant at Dayton, Ohio. Built adjacent to existing facilities, the new unit is about 30 by 40 feet and is a blower type ammonia cold storage system. Some $15,000 has been invested in cold storage improvements.

In the Spotlight

REPORT OF a field trip by New Orleans Chapter, NAPRE, led to the timely electrical article starting on page 13. That group toured the new Gulf Refining Co. Office Building last spring, where the 277/480-volt wye system overshadowed the air conditioning plant as the group's discussion interest. Advantages of such a system are manifest in both first cost and operational savings to building owners. Disadvantages lie in lighting switches, and adaptors required for tenants' electric office machines. Large air-conditioning tonnages are as much a contributing factor to adoption of these systems, as any other lighting or power demand.

AT THE NEW Lipton Tea plant a roomful of equipment keeps the relative humidity at a constant 50 percent, in room temperatures that vary considerably. This not only improves individual personal comfort, but also has a desirable effect on the mechanical operations. For details, see page 17.

THE NEED for new equipment to provide a wider range of industrial refrigeration was emphasized by a speaker at a meeting of The American Society of Mechanical Engineers. Industry, he said, will rely heavily on engineering know-how for the solution of many of its production problems. See article on page 18.

THE NATIONAL ICE Convention held at Los Angeles November 15 to 18 considered chiefly new ways of selling ice, including vending stations, and new markets for processed ice. Report of the meeting starts on page 19.

A TRAINING Program for fork-truck drives instituted by The Eastman Kodak Company resulted in decrease of accident frequency and the gospel of safe driving has been firmly implanted. With the thought that such a training program would be of value to members of the refrigeration industry the story starts on page 23.

FEATURES which should be considered when purchasing a refrigerated truck are outlined in the article on page 25. The author explains the purpose and means of applying vapor seal, insulation, and refrigeration. Other practical details covered include special requirements for different uses, how to calculate the amount of refrigeration needed, and description of standby refrigeration units.

AMONG the many complimentary letters received on the two articles on ammonia liquid recirculation and liquid-return systems by W. F. Stoecker in the November and December issues, one writer disagrees in the description of flooded coils. His comments and the author's reply are published on page 16.

CONTROL OF HUMIDITY in cold storage rooms presents many and varied problems. To meet this need, a dehumidifying unit was designed and put in operation. For description and pictures see article on page 27.

CONVERSION of coolers to freezers is not difficult, according to a leading refrigerated warehouseman, but several considerations must be kept in mind. Eight of these are listed and discussed in the article on page 26.

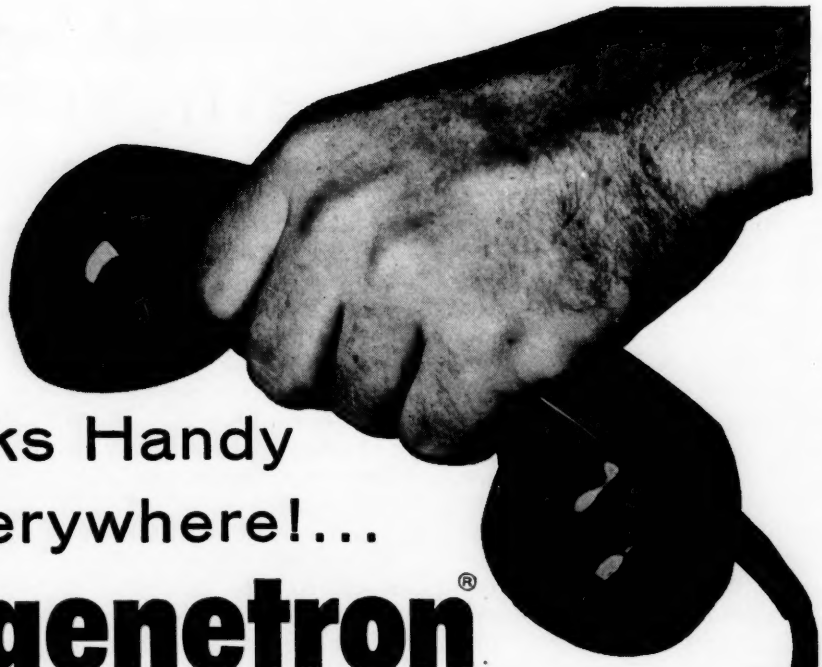
RESEARCH in the refrigeration industry was the subject of a recent talk by H. C. Diehl, director of the Refrigerated Research Foundation. Mr. Diehl combined discussion of functions of the Foundation with comments on the overall research picture as it pertains to refrigeration. Summary of his talk appears on page 28.

A MODERN Outdoor ice skating rink, 85 by 190 feet, with refrigeration unit has been opened on Chicago's northwest side. For description, see page 30.

MAINTENANCE expenditures by production industries were to have increased by one billion dollars in 1955, an electrical manufacturing executive predicted one year ago. Howard F. McCullough, general manager of General Electric's Service Shops Department, said that the figure will be approximately nine percent higher than 1954. He based his forecast on an industrial trend toward the use of automation, or automatic methods for continuous manufacturing processes.

Automation means expanded electrification. Maintenance functions will therefore assume increasing importance. The age of the "Grease-gun" maintenance man is ending. He will be replaced by the skilled specialist trained in the servicing of automatic and electronic equipment. NAPRE's Educational Committee didn't wait to determine how prophetic McCullough's remarks were. During the term just concluded, at the suggestion of the committee, many chapters scheduled speakers on the topic. On page 31, is a review of such a talk given at Los Angeles.

A RECORD attendance was drawn to the 9th Refrigeration and Air Conditioning Exposition at Atlantic City November 28 through December 1. For more details and pictures of representative exhibits, see page 47.



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C. Q. WIGGINS, JR.
Cary B. Gamble & Associates
New Orleans, La.

HIGHER distribution voltage in today's commercial buildings is a natural trend and practically a necessary movement dictated by the ever increasing loads which are today being imposed on the system. The main factors contributing to these increased loads are higher speed elevators, increased lighting intensities, increased use of business machines, and addition of air conditioning equipment.

Owners and engineers will obtain a good idea of the increased usage of electrical energy from statistics given in Table 1. Edison Electric Institute indicates that commercial and industrial groups with a demand of 50 kw or more consumed nearly twice as many million kilowatt hours of electricity in 1940 as this same group used in 1926; in 1950 over four times; and, in 1954, nearly sevenfold. It is no wonder electrical systems are becoming overloaded and that methods of combating this condition are being sought. One of these methods is by the use of higher voltage, lower current transmission.

Some years ago buildings were equipped with elevators operating at 600 fpm and requiring 25 hp to drive them. Speeds were then stepped up to 800 fpm requiring 42 hp, and recently 1400 fpm cars were installed in the new Prudential Insurance Company Building in Chicago, Illinois, with proportional increase in horsepower.

The trend toward better lighting has been a gradual process, but the ultimate has not yet been reached in intensity. In the past, ½ watt of incandescent lighting per sq. ft. was considered adequate for office space. Today, the average recommended lighting intensity for this same area is 35 to 50 foot-candles which requires 3-½ to 6 watts of power per sq. ft. using fluorescent fixtures. The fluorescent lamp, being approximately three times as efficient as the incandescent, has been of great assistance in reaching these higher intensities economically.

C. Q. Wiggins, Jr.

The necessity for keeping more and more records due to government controls, has brought about the use of automatic bookkeeping and accounting machines on a much larger scale than had ever been anticipated. As an example, one single machine of this type is rated 21,000 watts and is only one portion of an entire system. Since this equipment is usually supplied from the floor system, it will not be considered further at this point.

Air Conditioning Demands

The fourth factor which has contributed greatly to load increase in commercial buildings, whether by individual window units, larger isolated systems, or a single central system, is air conditioning. In order to air-condition a building containing 125,000 sq. ft. net area, approximately 500 tons of refrigeration would be required. This 500 tons in turn requires approximately 500 hp in compressor capacity and, depending on the type of system, from 250 to 350 hp in auxiliary equipment. The auxiliary equipment would consist of chilled water pumps, condensing water pumps, supply fans, cooling tower fans, and miscellaneous motors. The largest auxiliary motor, again depending on system design, would be approximately 50 hp.

From the foregoing, it may readily be seen that the 125,000 sq. ft. commercial building may require six elevators at 40 hp each, 750 hp in air conditioning load, 500 kw in light load, and approximately 200 kw in base outlet and auxiliary load. This load when served by the 208/120 volt wye requires approximately 4500 amperes. On this basis, today's office building may be compared to an industrial plant, both from the standpoint of complexity of equipment, and from the standpoint of connected load.

TABLE 1 — DEMAND GROWTH IN PAST 30 YEARS OF THE 50 KW COMMERCIAL AND INDUSTRIAL DEMAND GROUP

Year	Kw Hrs (In Millions)
1926	31,993
1940	59,557
1950	130,065
1954	200,155

Figures from "Statistical Bulletin", Edison Electric Institute, 1954.

Use Of 277/480 System Not New To Industry

Long ago industry adopted the 440 volt delta and 277/480-volt wye systems as the most economical, but until very recently commercial buildings had no alternative, if accepting power at their distribution voltage, other than the 120/208-volt wye. This system was adopted by the utilities as more or less a cure for all ills, since 208 volts could be supplied to 3-phase motors operating on 220 volts, and the single-phase load could be supplied by any phase and the neutral, or any two phases, depending on voltage characteristics (See page 30, July 1955, IR, Basic Electrical Control).

The 120/208-volt wye system is most prevalent in metropolitan areas and usually assumes the form of an underground network supplied by transformers located in underground vaults and connected in parallel. Service into the building comes in underground and terminates in a main switch or main breaker. From this point the same voltage is distributed throughout the building. Consequently, the expense involved in converting these networks to any other voltage would be very great since

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Author Wiggins is chief electrical engineer for Cary B. Gamble & Associates, consulting engineers, New Orleans, La., a position he has held since 1947. Born in Chattanooga, Tenn. he capped his formal education with an electrical engineering degree from Vanderbilt University in 1940. Two years as a lineman and three years as substation operator for Tennessee Electric Power Company constitutes his "practical" experience as an undergraduate. Since Vanderbilt days, he has had five years as supervisor, maintenance and construction, Aluminum Company of America, Fabricating Division, and two years with Godat & Heft, consulting engineers, New Orleans.

it would not only be necessary to change over all transformers but most of the electrical equipment in the building would have to be replaced.

Conversions To Be Slow

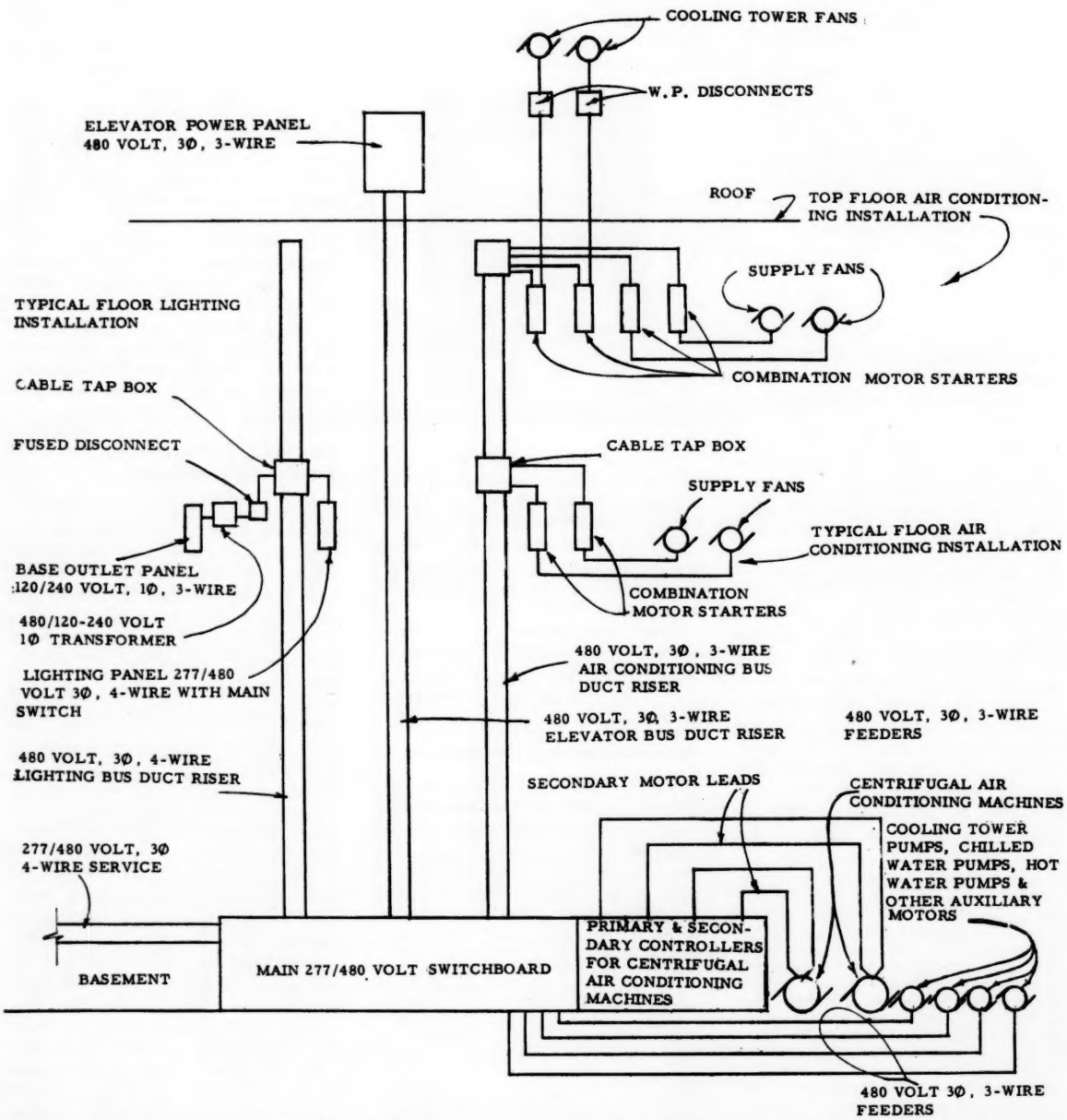
It is therefore to be feared that the conversion from 120/208 volts to 277/480 volts in the present network districts will be as slow as the conversion from direct to alternating current, which is still going on. Further, it seems that the main application for a higher voltage distribution at present is not in existing structures but rather in new buildings.

The system that meets load requirements, leaves room for future expansion, is economical and meets code requirements is the 277/480-volt wye, which is presently recognized by utilities, and is served by many of them, particularly in locations not on a network.

Similarities of Systems

The 277/480-volt wye is identical to the 120-208-volt wye in that 3-phase loads are connected across the 3-phase leads and single-phase loads are connected across any 2-phase leads, or across single-phase lead and neutral, depending on voltage requirements.

The main reason for going to the higher voltage is naturally economic. Savings in copper and raceway is



Typical riser diagram for 277/480-volt distribution system now being utilized for office buildings and commercial establishments. Large hp air conditioning equipment was a major demand resulting in adoption of this service.

affected, because of the lower voltage drop obtained and because more power can be transmitted using less current. This is best demonstrated by the following example:

It is desired to supply a 100 kw, 3-phase load located 300 feet from the source. Maximum voltage drop is three percent. What size conductor and conduit are needed (a) at 208 volts; and (b), at 480 volts?

$$\text{(a) Amps at 208 v.} = \frac{100{,}000}{\sqrt{3} \times 208} = 278$$

From voltage drop tables:

conductor size = 2 No. 4/0 per phase
conduit size = 2 − 2½ in.

This load could be carried a shorter distance on 1 − 350 MCM RH[1] per phase enclosed in 1 − 3 in. conduit, and meet code requirements.

$$\text{(b) Amps at 480 v.} = \frac{100{,}000}{\sqrt{3} \times 480} = 120$$

From voltage drop tables:

conductor size = 1 No. 1/0 per phase
conduit size = 1 − 2 in.

It is obvious that the reason for this reduction in conductor size lies not only with the lower current transmitted, but also in the fact that the permissible voltage drop at 208 is 6.24 volts whereas at 480 volts it is 14.4.

In the past, code did not permit the use of voltages over 150 to ground in commercial buildings. However, code now permits voltages up to 300 to ground on fluorescent fixtures in commercial applications; provided, that the fixture is mounted at least eight feet above the floor and is not equipped with a canopy switch. It is of interest to note that until recently some low voltage control relay type of switching had to be applied to the 277 volt system since no standard flush toggle switch was available in that rating. However, several concerns are now manufacturing these. Further, one well known manufacturer of fuses has applied to Underwriters' Laboratories for approval on a 277 volt fuse for mounting in fluorescent fixture bodies. These changes have all been brought about by the ever increasing necessity and demand for the 277/480-volt system and definitely indicate a trend in that direction.

Economic Advantages

As stated, the reason for using the higher voltage in new buildings is simply one of economy. It has been estimated that in a building containing 40,000 sq. ft. gross area per floor, and 20 floors in height (basements and penthouse not included), an original saving of $137,717.00 or 17.2 cents per sq. ft. gross would be realized using 277/480 volts in lieu of 120/208. This analysis[2] assumed that general area illumination was owner furnished 277-volt fluorescent and that each tenant was separately metered. It was also stated in this same article that a saving will begin to show using the higher voltage in buildings with a demand of about 500 kva, and that the larger the building, the greater the saving.

Of the four major loads affecting the power requirements in commercial buildings—elevators, lighting, bookkeeping machinery (which may be expanded to include any portable appliance normally connected to base outlet circuits), and air conditioning systems—three can in whole or in part be advantageously served from the 277/480 volt system.

Today's larger elevators ordinarily consist of a motor-generator set, a control panel and a hoisting motor. The motor-generator set converts the building alternating current into direct current which is used to drive the hoisting motor and to supply the control panel. The only change necessary to operate this equipment on 480 volts is a change in the voltage characteristics of the motor which drives the M-G set. Most elevator manufacturers will furnish this at no extra charge.

Doubles Lighting Fixtures On Same Service Circuit

From the standpoint of lighting, both Underwriters' Laboratories and Electrical Testing Laboratories now have approved various ballasts for 277-volt operation, the only necessary design change being in the turn ratio of the winding. Fluorescent fixtures then are available at the same price for 277-volt operation as for 120-volt operation; and, as mentioned before, such an installation is in accordance with code requirements.

It may also be noted that over twice as many fluorescent lamps of a given wattage may be carried on a No. 12, 20-ampere circuit using 277 volts to ground than on the same circuit using 120 volts to ground. It is impractical to operate the incandescent lamp load from the 277-volt source since code does not permit operation of incandescent lamp holders at voltages above 150 to ground in commercial buildings, and also because these lamps are less efficient and less durable at the higher voltage.

As previously stated, the business machine or base outlet load must be supplied by a 120-volt source because of a code limitation of 150 volts to ground, except for special appliances served by special outlets. Even though this limitation were not imposed on these outlets, it would be impractical to serve them at the higher voltage because tenants frequently migrate from one building to another. To convert or replace all portable appliances at the time of such a move would prove too costly.

These loads would then of necessity be supplied from dry-type transformers located as dictated by space limitations and economics, the dry transformer being rated 480/120-240 volts and connecting to the 480-volt riser through either a circuit breaker or fused safety switch. The 120/240-volt side would be connected to a standard switch and fuse or circuit breaker panelboard from which the branch circuits distribute. Economics dictate that this 120/240-volt portion of the system be single phase, 3-wire mainly because of the cost of the transformers.

First-Cost-Savings With 277/480-Volt Refrigeration

Remaining, and one of the most important, considerations is the air conditioning and miscellaneous motor load. In this category, the motor itself is of primary importance. Motors in the larger sizes (500 hp and over) rated 480 volts are available at a saving of approximately 10 percent.

In the smaller integral horsepower classification, a great number of motors are rated 220/440 volts, and are suitable for use on either the 120/208 or 277/480 volt system since the manufacturer's guarantee is valid for voltages 10 percent over or under name plate rating. These are therefore available at no price increase.

Copper and raceway sizes are materially reduced when the voltage is materially increased, as hereinbefore stated. For example, a 150 hp motor operating on 208 volts has a full load current of 382 amperes and requires 2 − 300 MCM conductors per phase in 2 − 2½ in. conduits. This same motor operating on 480 volts has a full load current of 166 amperes and requires 1 − 250 MCM conductor per phase in 1 − 2½ in. conduit.

Starting gear for the 480-volt motor is much more economical than for the 208-volt. Taking the same 150 hp motor used in the example above, it is most probable that the utility company would require reduced voltage starting; at least on the 208 volt

(Continued on page 50)

[1]One 350,000 circular mill heat resistant rubber insulated conductor rated at 167 F.

[2]Distribution Magazine Supplement, 1954; H. D. Kurt, General Electric Co.

LETTERS TO THE EDITOR

(Editors Note: Among the many complimentary letters received following publication of W. F. Stoecker's two articles on ammonia liquid recirculation and liquid-return systems, the following contained additional data of apparent use to INDUSTRIAL REFRIGERATION readers. The party also disagrees with the author in the description of flooded coils. His comments and the Author's reply are published here for the information of and any conclusions which the reader may care to draw.)

WE ARE delighted to see Professor Stoecker's article on liquid ammonia recirculation in the November 1955 issue and equally pleased with the second part on liquid return in December. With specific reference to the November issue, his explanations of where and how to use recirculation are very simply and clearly stated. The principle of down feed should be of particular interest to your readers.

The separating velocity for low pressure receivers given as 200 ft. per minute maximum is a generally accepted trade figure. However, we'd like to point out that this does not give complete liquid and gas separation, and the size of the liquid droplets, which will separate, can be calculated. These droplet sizes are as follows, for the different suction pressure conditions using 200 ft. per minute in a gravity separator:

10 in. Vac.	.0012 inches
0 lbs.	.0018 inches
5 lbs.	.0025 inches
20 lbs.	.0042 inches
30 lbs.	.0053 inches
45 lbs.	.0068 inches

Now a liquid droplet .004 inch in diam. and larger gets into a range of sizes like rain drops. Therefore, the use of a single separating velocity for calculations, particularly in high suction pressure conditions, will not always give satisfactory results. This is particularly applicable to the design of inter-coolers and flash coolers which feed the higher temperature rooms in a plant.

A more rational selection of separating velocity can be had by deciding what size particle you want to separate. Using a liquid droplet size of .0025 inch, the separation velocities in feet per minute for ammonia become as follows:

minus 40 F.	276
minus 20 F.	210
0 F.	157
plus 20 F.	134
plus 40 F.	110

These velocities can be used in Professor Stoecker's formula — separation area equals suction gas flow divided by separation velocity — to determine the separation area of the low pressure receiver.

Point of Disagreement

We would prefer to call Fig. 1, page 13, November I.R., a typical dry-expansion evaporator, and illustration is typical of what happens when flooding of this type is attempted. In our opinion, it could not be considered as typically representative of most manufacturers' designs of flooded equipment.

It should be emphasized that most conventional flooded evaporators can be operated with a liquid head of three feet. This represents a rise in the boiling point of three degrees at the inlet of the coil when the refrigerant temperature is minus 40 F. This three degrees also represents the temperature drop of the refrigerant through the evaporator tubes, and since the air temperature drop is generally more than three degrees with the usual vertical upward flow of air, the temperature difference between the entering air and entering refrigerant is greater than the leaving difference. Professor Stoecker's statement that the higher temperature boiling at the inlet of the evaporator results in some evaporator capacity loss is therefore extremely difficult to prove. It applies equally well to other forced feed systems.

For those evaporator coil designs which require more recirculation head than 3 ft. they can be handled with gravity circulation by mounting the surge drum at higher elevations. For example, there are several brewery stock houses of multiple stories which use a single surge drum on the roof to feed several room evaporators on the different floors. At the inlet of each evaporator is a balancing valve which performs the same function in the gravity circulation to multiple evaporators as the balancing valve in the liquid recirculation using a pump or trap.

W. V. RICHARDS,
H. A. Phillips & Co.

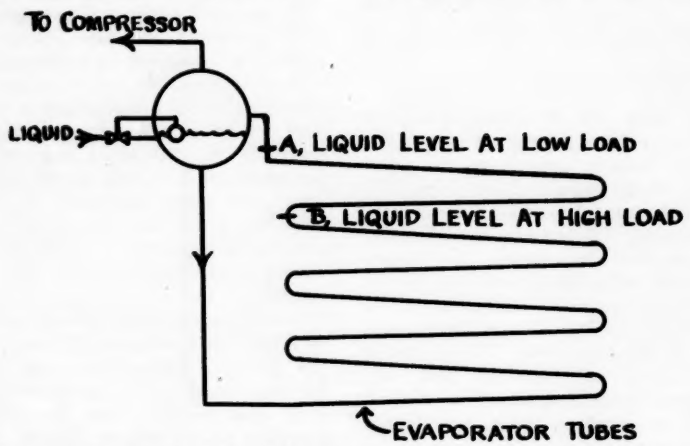


Fig. 1 — Conventional flooded evaporator showing levels of liquid in the evaporator at high and low refrigeration loads

The Author Replies

MR. RICHARDS' remarks are appreciated. The facts which he supplies on sizes of droplets that separate at various pressures and velocities are valuable data. This information is useful not only in liquid recirculation, but also in the design of any vessel which separates liquid from vapor.

Mr. Richards questions one main point: It a high-static head detrimental to evaporator performance? He points out that to keep the surfaces of the evaporator wetted and thus prevent superheating, the level of the float chamber is usually elevated about three feet.

The static head causes a rise in the boiling point which is always detrimental to heat transfer. If a comparison is made with the performance of an evaporator which is at the saturated suction temperature throughout, an elevation in temperature at any point in the evaporator decreases the mean-temperature difference between the ammonia and the fluid being chilled.

For a given evaporator area and overall heat-transfer coefficient, a reduction in the mean-temperature difference causes a proportionate drop in heat transfer. Mr. Richards is correct in saying that there will be an increase in boiling point due to static head in recirculation systems if he is

(Continued on page 50)

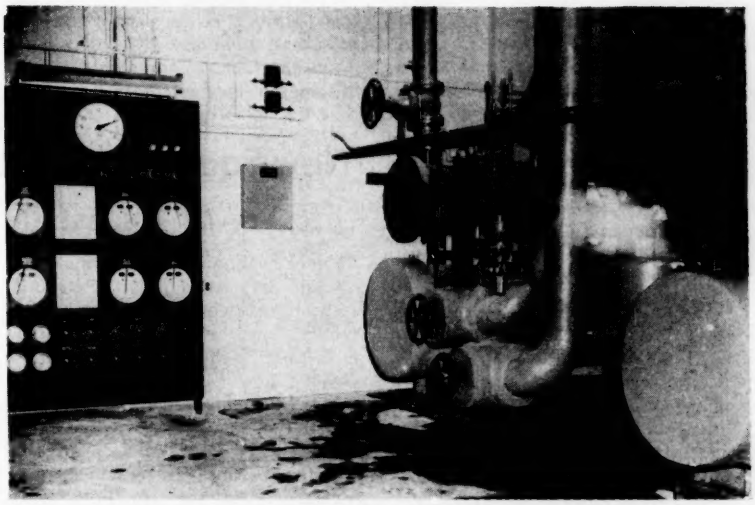
New Tea Plant Operates Own Weather Factory

RICHARD CARDEN

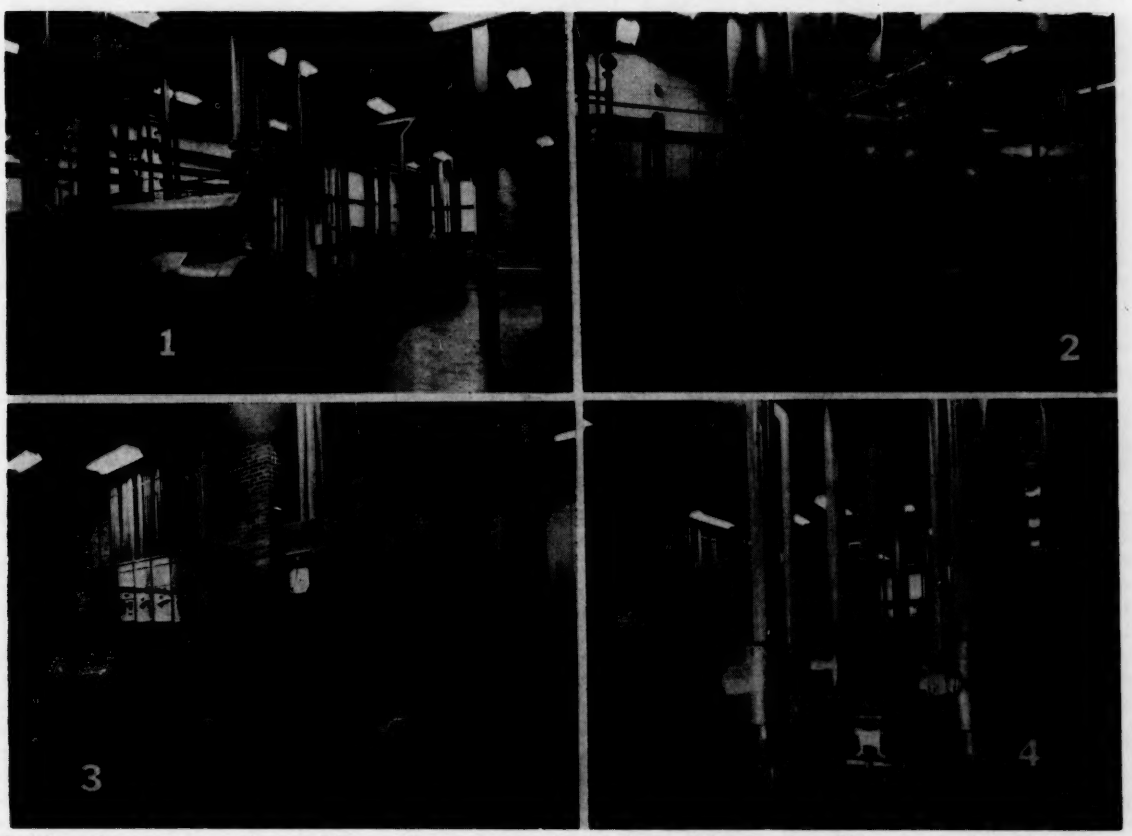
MADE to order weather, long dreamed of by scientists, has become a reality, at least at the new Suffolk, Va. plant of the Thomas J. Lipton Tea Company. At the new plant, a roomful of compressors, boilers, valves, pipes, pumps, tubes, gauges and instruments keep the relative humidity at a constant 50 percent, while permitting the room temperature to vary according to the whim of the individual and the outdoor temperature.

Humidity Controls Taste

The relative humidity is the thing that really makes for comfort or discomfort at a given temperature, the higher the humidity the greater the discomfort. At Lipton's however, the comfort of the individual is only half of the story. The other half is the effect of too much or too little moisture in the air on the tea and the mechanical operations.



The heart and brain of the temperature and humidity control system used in the new Thomas J. Lipton Tea Company plant. Air conditioner on the right and on the left is the instrument panel, which gives constant readings.



Refrigerating equipment in new Lipton Tea Company plant. 1—Two 110-ton air conditioners provide refrigeration. 2—Two 100-hp boilers, part of the air conditioning system. 3—Controls for blower units which regulate humidity. 4—Pumps circulate water throughout the building.

As explained by John Byrne, plant manager, too much or too little moisture in the air has a definite and adverse effect on the flavor of the tea. And the flavor, he said, is obviously the most important single criteria in judging tea. As for the machinery, too much moisture makes the paper used for bagging tea hard to handle, and causes the paper boxes in which the bags are packaged to jam and clog the machines.

Too little moisture creates static electricity, which in turn causes the paper to fold poorly and the boxes to stick together. So much for the trouble — now to get rid of it.

Year Round Operation

The heart of the system is two 110-ton air conditioners, backed up by two 100-horsepower boilers. Summer and winter, the boilers operate, and except during the heart of the winter, the air conditioners operate, working together to achieve the desired temperature and humidity.

The system operates on the accepted principle that as temperature goes down, the relative humidity goes up. This is due to the fact that relative humidity is the ratio between the amount of moisture the air is holding at a given temperature as compared with the amount it could hold if it were saturated. Warm air can hold more moisture than cold air.

To begin the cooling system, the air conditioners are cut into service. Operating in a closed water circuit, pumps circulate water through the building. The water picks up heat and is returned to the plant. At that point the "Freon" refrigerating plant takes heat from the water, and the chilled water is recirculated through the building to pick up more heat.

In the building, four master controls, each controlling a blower unit take care of the humidity; as the fan units blow the chilled air across the controls, a wet and dry bulb temperature is taken, and a humidity reading is taken. If the humidity is too high, the air is chilled below the temperature wanted. At this lower temperature, the air is not able to hold as much moisture, and some of the water is precipitated out of the air. This air however, is now too cool for comfort — about 40-50 degrees.

Reheat Application

Then the boilers go into operation and heat the chilled air back to the desired temperature before the fans blow it into the room. In winter, fresh air is taken in from the outside and heated by boilers. It is then piped (ducted) to the controls. If the humidity is found to be too low, as it is most of the time in winter, a control opens a nozzle which sprays water into the moving stream of air, thereby increasing the amount of moisture in the air. The air is then blown into the building, at the proper temperature and humidity.

In the offices, individual air conditioners keep the temperature at the point desired by the worker. These units do not have humidity control, but simply take in fresh air from the outside and heat or cool it as the season demands. Inside the conditioners are coils which carry the same heated or chilled water that is used to heat or cool the processing building itself. The humidity is taken care of by the controls, thus insuring cool, correctly humid air.

New Equipment Needed for Wider Range of Industrial Refrigeration

THE availability of thermo-dynamic data on at least 25 potential refrigerants with boiling points extending over a 400 F range offers a distinct challenge to engineers to develop new equipment for extending the benefits of mechanical cooling.

The field of refrigeration applications has barely been scratched, R. C. McHarness of the Du Pont Company's "Kinetic" Chemicals Division added in a talk to members of the American Society of Mechanical Engineers at Chicago, November 18. Industry, he said, will rely heavily on engineering know-how in the next several years to apply cooling, particularly in the ultra-low temperature range, to the solution of many of its production problems.

Better, more versatile metals with added strength to withstand higher temperatures in various types of equipment might be obtained through use of refrigerants as low-temperature quenching baths. Mr. McHarness pointed out. Such processing already has proved important in production of certain types of steel, where the crystal structure of the metal can be controlled by refrigeration to obtain much better dimensional stability.

Temperature Range Expanded

Among other fields of investigation for engineers, the Du Pont chemist suggested a wide and relatively new field existed in design of equipment for environmental testing of the behavior of both men and materials.

"The temperature range has been expanding," Mr. McHarness explained, "until today people are considering the feasibility of environmental chambers that will cover the range from minus 250 to plus 600 F." Design of cascade refrigeration systems, utilizing extremely low boiling refrigerants to achieve such temperatures, is a distinct challenge to engineers.

Storage of natural gas in its liquid form by cooling it below its boiling point is an important goal and will require a new concept of design in low-temperature refrigeration equipment, he added. A practical system for achieving and holding the low temperatures required would result in considerable saving in storage and transportation equipment. It might also provide an economical source of supplemental refrigeration in the cooling power of the liquefied natural gas when it is vaporized to its gaseous state for fuel use, Mr. McHarness said.

Used in Nuclear Research

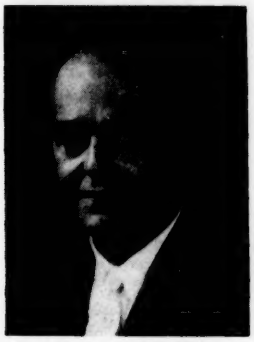
Low temperature refrigeration is also important in the field of nuclear research, he explained. In very high vacuum equipment such as the cyclotron, the use of a cold trap ahead of the diffusion pump helps remove condensibles and slow down the air molecules so that they are more easily entrained by the working fluid of the diffusion pump. Cascade systems employing "Freon-13" and "Freon-22" refrigerants have been used successfully, while a compound compression system using only "Freon-13B1" refrigerant has been operated successfully at temperatures as low as minus 130 F.

"These are a few examples of what the refrigeration engineer has been able to accomplish with the refrigerants and thermo-physical data which are available to him today," Mr. McHarness said. "Other new uses will develop as we learn more about the tools we have to work with in this field."

Possible refrigerants include everything from water, in absorption systems, he told the ASME, to methane. A dozen "Freon" compounds, particularly useful because of their nonflammable, nonexplosive, and low toxicity characteristics, are available with boiling points ranging from minus 198 to plus 118 F.

New Ways of Selling Ice is Theme of Annual Ice Convention—November 15-18

ICE MERCHANDISING by means of newer or more attractive presentations was the principal topic of discussions at the 38th Annual Convention of the National Association of Ice Industries at the Biltmore Hotel, Los Angeles, California November 15 to 18. Of twenty such addresses, over one-half of them dealt with various aspects of ice merchandising. Underlining all of the talks was the theme of the convention, "High Gear For Next Year." Perhaps the newest approach to this type of



E. L. Gunn Jr., President N A I I

marketing was the suggestion by retiring president, Paul H. Andres, that milk men would soon become the nation's icemen.

Merchandising talks were given by K. J. Sartori, National Ice and Cold Storage Company, San Francisco, Earl O. Johnson, Liebmann-Arctic Ice Company, Oklahoma City, R. N. Burgess, Jr., Rainier Ice and Cold Storage, Seattle, Walter J. Hintz, Borin Brothers, Detroit, J. C. Rear, Union Ice Company, San Francisco, R. A. David, Duval Ice & Coal Company, Jacksonville, and Paul Ashley, Central California Ice Company, Fresno. Mr. Sartori's discussion was of a practical nature, dealing with improvements made by his firm on the sizing of ice by modifying existing equipment. Retailing of ice through supermarkets, drug stores and packaged-beverage dealers was the topic of Johnson's presentation, while Burgess emphasized the importance of service and good aggressive salesmanship.

Hintz reported on the vending business in his area, pointing out how the ice producers in Detroit had shared in radio and TV advertising, to the benefit of all. Three specific applications of ice in the vegetable and leafy produce growing areas of California, namely, house-cooling, hydro-cooling and vacuum cooling with ice, were explained in the discussion by Rear. David's discussion was somewhat in retrospect, comparing pre-World War II, wartime and postwar periods of the ice industry. The important and growing use of ice for preserving taste and texture of poultry, and its applications was covered in Ashley's discussion.

Officers Advanced

Following time honored traditions, delegates at the convention accepted the report of the nominating committee and advanced the principal officers of NAII for the 1955-56 term. E. L. Gunn, Jr., Atlanta, is the new president of the association. First vice-president is Richard C. Muckerman, St. Louis, and second vice-president is P. W. Easton, Los Angeles, California. Mr. Easton had been a director-at-large and was convention chairman for the 38th meeting. Treasurer George Steers of Kalamazoo and Executive Secretary Guy W. Jacobs of Washington, D.C., were retained in their present capacities.

Atlantan Elected to Top Ice Post

E. L. Gunn, Jr., Atlanta, Ga., elected the nation's chief iceman, is president of the American Service Co. A native of Florida, Mr. Gunn, at the age of 16 became active in the ice business. Upon graduation from Georgia Tech in 1926 with a ASME degree, he became associated with his father in the management of the South Jacksonville Utilities Co., thus becoming a second generation iceman.

In 1929, he became manager of the American Service Company's Atlanta properties. Subsequently, he was appointed division manager of the organization's Southeastern Division, comprising ice and coal properties in Georgia, Tennessee, Alabama, North Carolina, Virginia and West Virginia. He served as vice president of the company in 1951 and since 1952, when elected president, he has piloted the seven state group of ice properties and related businesses.

Mr. Gunn has previously served as chairman of the operating committee of National Ice Public Relations, Inc. He is a member and past section chairman of the American Society of Refrigerating Engineers. In addition, he is past president of the Atlanta Lions Club and a member of its board of directors. He works with the Chamber of Commerce and the Associated Industries of Georgia.

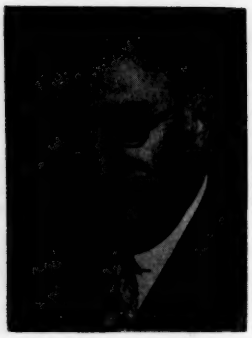
Division presidents who automatically become members of the NAII board of directors for a period of one year upon their election at the division level are: New England, P. Bernard Hogan, Springfield, Mass.; Great Lakes, Eugene K. Wellman, Detroit; Western Division, J. R. Dean, Cape Girardeau, Mo.; Southwestern,

Paul H. Andres Past-president N A I I

K. F. Addison, Tulsa and Northwestern, S. W. Garvin, Jr., Vancouver. Other division presidents held over on the board are Eastern, H. H. Snyder, Alexandria, Va.; Southeastern, G. Luther Rosebrock, Charleston, S.C.; Southern, W. W. Simmons, Jr., Memphis; Mountain States, L. L. Belcher, Pueblo, and Pacific Coast, V. V. Ogburn, San Francisco.

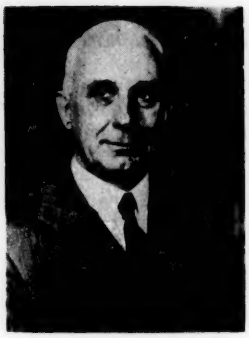
President's Address

In the principal address at the first session on Tuesday, retiring president Andres predicted that within a very few years every milkman will be an iceman. Mr. Andres, who has for many years been chairman of the Association's Marketing Committee, and whose progressive merchandising ideas have inspired the industry for more than a decade, told the delegates and guests in attendance that

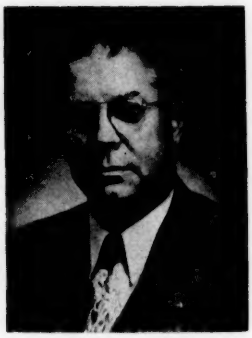


Richard C. Muckerman, Vice-president N A I I

Paul W. Easton Vice-president N A I I



George Steers Jr., Treasurer N A I I



Guy W. Jacobs, Exec-Secy N A I I

"Progressive dairies have equipped their milkmen with refrigerated trucks to enable milkmen to handle ice cream and frozen foods as well as bread. They can handle ice and there's no reason why they shouldn't."

He pointed out that ice today is available in take-home water-proof bags in sizes ranging from five to 25 pounds. He emphasized that more and more families are becoming acquainted with the taste values and other advantages of crystal clear iceman's ice; they have indicated their wants in smaller sizes for storage in the freezer compartment of their refrigerators, and larger sizes for their home freezers cabinets.

Ice Cubes Popular

"It's out-of-style to borrow ice from your neighbor," Mr. Andres said. "and ice is so inexpensive a family can't afford to be ice-misers". He called upon the industry to establish both a research and a merchandising fund to tell the story of ice and to publicize year-around uses and advantages. One important discovery during the past year by the industry, he said, is that most wives prefer ice in its cube form over all other forms. One of the biggest industry problems today, he said, is to develop machinery that will manufacture cubes economically and efficiently. Present machinery is satisfactory, he indicated, but is cumbersome and more expensive than the industry would like for it to be.

Confirming his remarks, some of the following statistics were gathered during the convention proceedings: Today with 3000 companies serving the public, ice is available not only in blocks but also processed in various sizes ranging from ¼-inches to almost 2-inches. Last year the industry sold 747,521 tons of cubed ice alone—equivalent to 15 billion individual cubes. Total ice sales amounted to 30,183,785 tons at an average price of $7.49 per ton, making ice a $227 million industry. Fifteen years ago the vast majority of the nation's 4,500 ice companies sold nothing but block ice.

Practical Suggestions Reviewed

Shop talks followed the three practical speakers on each daily program. Many questions were asked from the floor and there was participation by the delegates as well as the speakers in the practical discussions. One item brought out following K. G. Sartori's discussion of "A Better Mouse Trap," was the fact that The National Ice and Cold Storage Co. had developed a speedy car-icing operation at a Yuba City, California, plant. Mr. Sartori said that the firm is initially icing four cars at a time in 20 minutes with only two men. He agreed that it was an unusually fast arrangement for only a four car spot, but believed

National Ice Officers and Directors for 1956

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President: E. L. Gunn, Jr., American Service Co., Atlanta, Ga.

First Vice-President: Richard C. Muckerman, City Products Corp., St. Louis, Mo.

Second Vice-president: Paul W. Easton, Union Ice Co., Los Angeles, Calif.

Treasurer: George Steers, Kalamazoo Ice & Fuel Co., Kalamazoo, Mich.

Executive Secretary: Guy W. Jacobs, Washington, D.C.

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Eastern: H. H. Snyder, Alexandria, Virginia.

Southeastern: G. Luther Rosebrock, Charleston, South Carolina.

Great Lakes: Eugene K. Wellman, Detroit, Michigan.

Southern: W. W. Simmons, Jr., Memphis, Tennessee.

Western: J. R. Dean, Cape Girardeau, Missouri.

Southwestern: K. F. Addison, Tulsa, Oklahoma.

Mountain States: L. L. Belcher, Pueblo, Colorado.

Pacific Coast: V. V. Ogburn, San Francisco, Calif.

Northwestern: S. W. Garvin, Jr., Vancouver, British Columbia.

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Frank A. Mitchell, Hampton, Virginia.
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H. O. MacLean, Santa Barbara, Calif.
Allen Rushton, Birmingham, Ala.
J. Frank Rushton, Jacksonville, Fla.
William J. Rushton, Birmingham, Ala.
H. D. Sanford, Syracuse, N.Y.
L. L. Swartz, Indianapolis, Ind.
J. C. Thompson, Dallas, Texas.

that it would not be adaptable on a larger scale.

R. N. Burgess, Jr., of Rainier Ice & Cold Storage, following his discussion "We're In There To Stay", brought out the fact that he had only started in the ice business in 1950. He bases the success of his firm and his own personal advancement on service as the most potent instrument to ice sales. Next to service, he told how personal calls on the customers got results. Where he was competing with an ice making machine installation or proposal to install same, he drew up cost analysis sheets based on performances and experiences of other friends and customers. These cost analysis sheets invariably helped him sell the job, but service was a big factor even in such a presentation.

He also suggested that icemen be on the lookout for new lines. He stated that locally they had considerable success in supplying snow-ice to a commercial firm which made "Jello" molds for caterers, restaurants, hotels and some retail trade. This new "Jello" by General Foods Corporation can be used with snow-ice instead of the boiling hot water previously required. The ice sets the product more quickly and thereby saves manufacturing time. Further, it jells so rapidly that fruits or vegetables placed in the "Jello" product will not settle to the bottom of the mold as so often happens with the old process.

Retiring president Paul H. Andres offers congratulations and best wishes to newly elected president E. L. Gunn Jr.

Vending Stations

In the discussion Thursday morning, following the industry speakers, Walter J. Hintz, brought out a few statistics of interest to ice firms handling vending stations. He pointed out that the Detroit ice manufacturing firms have an ice vending station for every 20,000 population or approximately every 4 to 5 thousand families. In his preceeding talk he had indicated that ice was available on every main street in Detroit. The three ice companies there have a total of 166 28-foot vending stations. One firm, with 60 of these stations, had grossed $295,312.00 in the season just passed.

Mr. Hintz told of how the three ice companies in Detroit do co-operative advertising on available television channels, radio and three daily newspapers. He contends that TV keeps people at home, has them doing their entertaining at home and promotes business for the vending stations. He said New Year's Eve and New Year's Day are closely competing with the 4th of July in regards to ice sales. In Detroit they merchandise cubes in 12½ lb. bags. Ownership of the vending stations remains with the ice company and the lessees receive commissions only.

It was also brought out that for every new vending station opened, these ice companies in the Detroit area stage a typical Hollywood premier with searchlights and give-aways, such as snow cones for the children and bags of ice cubes for the adults. During the press interview Mr. Hintz countered the question as to the decline in the ice business by paraphrasing a very popular statement of the Army's General MacArthur. He stated "Old ice men and ice companies never die, they just melt away". He feels that the decline in block ice sales might be natural, but when icemen complain of processed ice business declining it is their own fault that it is melting away.

Cooling With Ice

Three particular industrial applications mentioned briefly in J. C. Rear's discussion came up again in shop talk. They were house-cooling, hydro-cooling, and vacuum-cooling. Mr. Rear described how his firm put up small ice pre-cooling houses on growers or ranchers property to assist these farmers not only with pre-cooling but also with holding their produce for a favorable market or available cars for shipping. Answering the question as to average size house-coolers, he indicated that the average size would be about 30 cars although a great majority of these houses run much smaller. A few 100-car houses had boosted the average to 30. He estimated that in California there were over 100 of these house cooling projects in operation.

A few new mechanical developments in the delivery of ice at the side of the hydro-cooling unit, and the pumping of the chilled water through the cooler, were discussed. Some of the new developments also included better facilities for handling crated products on pallets. Most of the question arose, however, on the use of ice in connection with the relatively new vacuum-cooling process for leafy produce. This had been discussed somewhat in detail at the NAPRE convention which preceeded NAII by one week in Los Angeles. Mr. Rear mentioned the two basic commercial methods for accomplishing vacuum cooling. One of these employs a steam jet system for producing the vacuum. The other method employs a combination of mechanical vacuum pumps (sliding-vane type blowers) and mechanical refrigeration.

The latter may be supplied by any standard ice plant equipment which makes a refrigerant such as ammonia available for use in cooling coils. The vacuum producing circuit consists of the retort, a blower and coil on top

of the retort, a mechanical vacuum pump of the sliding vane type, and an ammonia circulating pump to supply ammonia to the coil.

The vacuum pump pulls a vacuum of about 29 in Hg. At this point, the blower and ammonia pump are started (while the mechanical vacuum pump continues to pull on the retort). The final stages of vacuum are thus produced by the refrigerated coil, in much the same way as a steam condenser pulls a vacuum for a steam turbine.

Mr. Rear's firm, by the use of ice has brought vacuum pre-cooling within the reach of the independent operators. It has greatly simplified the vacuum cooling apparatus. Actually the ice is used as a vapor condensing medium instead of the ammonia in cooling coils. In other words, ice is an economical expendable refrigerant for seasonal applications. Its use allows the smaller independent rancher or operator to compete with the larger installations having a permanent refrigerating plant used in connection with the vacuum-cooling retorts.

Safety For The Ice Industry

In a talk on Safety, A. R. Carstensen, Sacramento, Calif. asked the ice industry point blank who pays the bill for the lack of an effective safety program. In his talk he presented a break-down of insurance rate structure in order to show how every act of carelessness or failure to develop safety-mindedness, eventually results in an increase of insurance premiums for the industry. This increase because of compensation payments is not levied over all industries in the United States, he pointed out, but it is assessed to the ice industry itself. His talk cited dollars; dollars more in dividends for the stockholder and dollars more in take-home profits for the plant owner through an intelligent safety program. In the discussion which followed he showed where one firm's savings, as a result of a good safety program, amounted to $1.10 per share of stock. This amount reduced by the Federal Income Tax, still totaled half the cash dividends paid by the firm that year.

Business Session

Principal reports and addresses of a business nature took up most of the program on Tuesday, when the 38th meeting opened. George W. Heath was one of the first speakers and credited the exhibitors for rendering the Association and the industry considerable help in the past few years in the development of machinery for processing ice to the popular sizes demanded by the public today. There were 27 exhibitors represented in the exhibit hall adjacent to the meeting.

Mr Heath called out the representatives of each firm and briefly introduced their line to the delegates present. He pointed out that in 15 years the industry had seen the average wage in the plant increased on an average of 10 cents per hour per year, plus numerous fringe benefits. It was his opinion that the exhibitors and associate members of the ice industry had contributed much to helping the industry reduce its operating costs through their many labor saving devices.

Association Staff Reports

The Association business was covered in the annual reports and recommendations of Guy W. Jacobs, Executive Secretary, C. P. Austin, Director of the Association's Research and Marketing Department, and William T. Jobe, General Counsel. Treasurer, George Steers, also made a detailed report. Director Austin's report was highlighted by his announcement that an unbiased and informative piece of literature would soon be available on the deionizing of water for industry use. He also indicated that research would continue on the specialized ice business, such as the need for standardizing on bag sizes and shapes.

Special Speakers

The association continued its traditional manner of presenting a speaker a day on topics of current interest. These speakers were Carl P. Miller, President, Los Angeles Chamber of Commerce; Dr. W. Ballentine Henley, President, College of Osteopathic Physicians & Surgeons; Rilea W. Doe, Vice-President, Safeway Stores, Inc.; and, The Reverend Bishop Gerald Kennedy, Resident Bishop for the Methodist Church of Los Angeles.

Mr. Miller told the convention delegates not to underestimate the west when they plan their future expansions. "Just in the last few years I have sensed an awakening of new attitudes toward the west," he said. "No longer are we looked upon as an economic colony of the east, but as a great empire in our own right, well integrated with the activities of the nation as a whole."

The Invocation opening the 4-day session was by The Rev. William J. McIntosh, S. J., Loyola University Industrial Relations Center.

The Exhibits

The usual varied and interesting equipment and supplies were shown by the following exhibitors:

Ballard Sales Company, Fort Worth 1, Texas.

Barnes Ice & Fuel Co., Gary, Ind.

Batemen Foundry & Machine Co. Inc., Mineral Wells, Texas.

K. G. Brown Manufacturing Co. Inc., Mattituck, L.I., New York.

Dave Fischbein Company, Minneapolis, Minn.

Gifford-Wood Co., Hudson, New York.

U.S. Grant and Associates, Los Angeles, Calif.

Anthony Hall Associates, Oklahoma City, Okla.

Hamer Machine Company, Minneapolis, Minn.

Ice Carvings Company, Hollywood, Calif.

Ice Plant Equipment Co. Inc., Philadelphia, Penna.

Index Coupon & Supply Company, LaPorte, Indiana.

The Leer Manufacturing Company, New Lisbon, Wisconsin.

The Lilly Company, Memphis, Tennessee.

National Rejectors, Inc., St. Louis, Missouri.

Nickerson & Collins Co., Chicago, Ill.

The Ohio Galvanizing & Manufacturing Company, Niles, Ohio.

The Perfection Ice Scoring Machine Co., Fort Worth, Texas.

Refrigeration Engineering Company, Montgomery, Minnesota.

S & S Vending Machine Company, San Jose, California.

Sturdy Built Manufacturing Co., Des Moines, Iowa.

Union Bag & Paper Corporation, New York, N.Y.

Valley Foundry & Machine Works, Inc., Fresno, California.

Vivian Manufacturing Co., St. Louis, Missouri.

York Corporation, York, Penna.

Zellerback Paper Company, San Francisco, Calif.

Secretaries Annual Meeting

The Unit Secretaries held their usual annual meeting on Tuesday morning, November 15. It terminated with a luncheon session at noon. Inasmuch as all of the business was not completed, another session was held on Thursday beginning with a luncheon.

The following officers were re-elected for 1956: President, Robert W. Walton, Secretary of the Indiana Association of Ice Industries; Sec-

(Continued on page 50)

Training Program For Lift Fork Truck Drivers Reduces Accidents and Saves Time

MATERIALS handling equipment has become more popular in the industrial refrigeration field within the past 15 years. Equipment such as powered lift fork-trucks is found in many refrigeration plants and warehouses throughout the country.

One of the finest training programs for employees utilizing powered driven fork-trucks has been developed by the Eastman Kodak Company, Rochester, N. Y. E. D. Happ, safety department and A. C. More, training department, both of the Kodak Park Works of the Eastman Kodak Company, felt that with the large use of lift-trucks in their organization there was a definite need for a program that would train new operators of fork trucks, as well as giving more detailed instruction to drivers with previous experience.

Both men agreed that if the program was to obtain the desired results, supervisors of fork-truck operations should also receive instruction and training, comparable to that given to the experienced driver.

Training Program Drafted

A fork-truck training program was drafted by Happ and More and others working with them. Specific needs to make the program a success were submitted to management for consideration. Recommendations included the need for centralization of training, provision of a practice driving area and the number of hours needed to process a group of trainees. The estimated cost for the whole program also was included in the recommendations submitted. With management's approval, the rough material was presented to departmental representatives for their comments and suggestions.

The committee then refined the proposed training course material and three new members were added to the safety department staff for the purpose of instruction both in the classroom and on the driving range. The safety department obtained three fork-trucks. Three thousand square feet of floor space was allowed the program for driving range practice.

The final program consists of a 16 hour course for experienced operators and a 32 hour course for inexperienced operators. These include discussion type lectures, visual aids, printed materials for each session and frequent quizzes, all of which aid in maintaining interest. Classes are limited to six trainees.

Following is a resume of the material covered in each of the ten sessions for new operators. Most of this material is condensed to five sessions for experienced operators, who being familiar with truck operation and terminology, can absorb the instructions at a faster pace.

This article on a training program for fork-truck drivers, instituted by the Eastman Kodak Company may offer a suggestion to operators of refrigerated warehouses and other members of the industrial refrigeration industry. It has greatly improved the technique and safe operation by the drivers who received the specialized instruction.

Outline of Sessions

Session 1—This first class introduces trainees to the purpose of the training, to simple operating procedures, daily checks which they must make and gives them time for simple maneuvering with the truck on the driving range.

Session 2—Features a quiz on Session 1 and considerable practice on obstacle course No. 1.

Session 3—Places emphasis on pertinent facts about power industrial trucks such as load limits, striking force, comparative cost of fork-trucks, batteries and types of trucks used in the Kodak Park plants, along with their limitations and adaptions.

Session 4—Takes up the various problems involved in handling palletized material.

Session 5—Specifically presents the safe and efficient practices to be followed in truck and trailer loading and unloading operations.

Session 6—In like manner, the time of trainees is confined to that of handling material in connection with freight car operations.

Session 7—Introduces single pallet storing. Explains where not to place materials and how to place them in proper storage areas.

Session 8—This session is a crucial one for many operators since it introduces the methods and problems involved in tiering and stacking of palletized material. Special aptitude is required to master the techniques of upper level work.

Session 9—At this time the trainee is given his final examination on the driving range. During his time in the classroom a number of items are discussed such as elevator operations, pallet patterns and crossing railroads.

Session 10—This session is devoted to instruction and discussion of the operator's responsibility in preventive maintenance.

Discussion of the results of quizzes is encouraged. Trainees are clearly informed that the purpose of the quiz is to assure the instructor that he has succeeded in putting across the material in an understandable manner. Trainees are graded only on the results of their driving range performance.

Problems Cover Actual Driving Situations

Problem driving sessions pertaining to situations which arise under actual driving conditions are set up, and the driver is required to solve these problems. Obstacle course driving sessions help develop skill and confidence, to break bad habits of old drivers and to assure that both new and old operators form good driving habits. New drivers, of course, spend a much greater percentage of time on the range then do seasoned drivers. Two instructors are present at all times on the driving range for verbal coaching and individual instruction.

One of the prerequisites to entering the course is that the operator be physically right for the job. Items considered in this medical check include field of vision, reaction-timing, distance-judgment, and possibility of other physical handicaps which might detract from the operator's ability to safely handle the truck under stress or strain.

The results of this carefully conducted safety training program at Eastman Kodak Company are:

1. Approximately eighty supervisors are better acquainted with safe fork-truck operations.

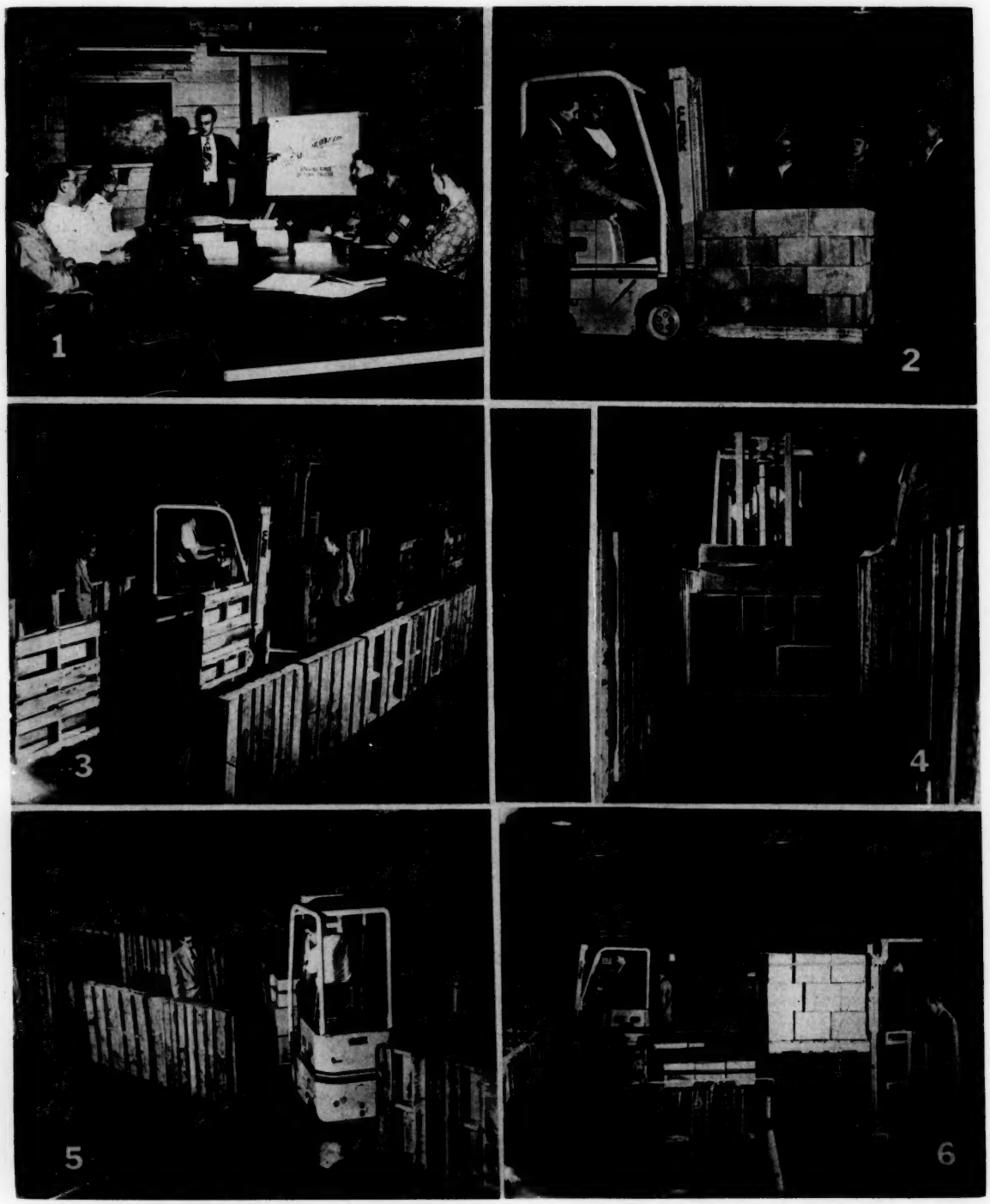
2 Twenty-four of the Fire Department staff are trained to enable them to move valuable material in the event of an emergency.

3 Approximately a hundred new drivers have completed the training and are operating throughout the plant.

4 Retaining of over 400 experienced drivers is nearing completion.

5 All drivers are to be licensed so that only authorized and trained persons can operate trucks. This license is issued only after proof of ability on the job and by request of his foreman.

6 The fork-truck accident frequency has steadily decreased since the days prior to the first training session. The gospel of safe driving is spreading beyond the confines of the classroom.



Fork-Truck Drivers Training School in Action.: 1-Classroom session. 2-Demonstration overload. 3-Drilling on pivot point. 4-Narrow aisle for teaching accuracy and precision. 5-Freight car loading and unloading. 6-Final driving test.

Refrigerated Truck Bodies—How to Equip Them to Fit Individual Needs

THREE features that should be considered when purchasing any refrigerated truck are: the vapor seal, amount and types of insulation, and the type and amount of refrigeration.

A vapor seal is merely a process of keeping the insulation material dry. As the moisture content increases there is a decreasing value in the insulation material. All vapor seal should be placed on the warm side of a storage room or truck body. Normally on a medium temperature of 35 to 40 degrees, truck body builders feel that as good a vapor seal is not required as for low temperature work, chiefly because the medium temperature is above freezing; consequently, any moisture that forms in the insulation material is still in the form of water and has a tendency to work its way out. On a low temperature body there is a different condition in that the moisture freezes and becomes ice and decreases the effectiveness of the insulating material.

On medium temperature type construction, about all our truck body builders do in the way of a vapor seal is to spray the exterior of the panels with a heavy coat of asphalt thick base emulsion, or some other type of sealer which, in addition to acting as a vapor seal, also acts as an adhesive for the insulation. In other words, it is something to hold the insulation material in the proper place.

Insulation of Body

On a low temperature type body, the first process is to leave what body builders call a dead air space, the width of the post or framing structure which is left open from the outside panel to the inside of the structure, which acts as an insulant and also as a vapor seal. Next process is to use a layer of aluminum foil paper facing the exterior, which has a tendency to reflect the heat that may come through the side wall panels. This may be more theory than fact. We builders do not know, but it does seem to do a fairly good job.

Next is used a layer of one-eighth inch tempered masonite, and this in turn is sprayed with a heavy coat of asphaltic base emulsion. Then, apply a heavy layer of kraft paper, and spray this paper again with a heavy coat of emulsion. Thus there are five additional steps to protect the insulation material in a low temperature type body over what is done in a medium temperature body.

In choosing insulation materials the quality and the cost must be considered. They vary from approximately three and a half cents a board foot to approximately thirty-two cents a board foot. That means a cost difference of approximately $600 for a twelve-foot low temperature body; a considerable sum of money.

Floor Insulation

For the floor, we normally use a type of insulation with a high compressive strength because all of the weight is on the floor. Our firm still uses cork. However, we know that such insulations as Styrofoam and Rubbertex have advantages. Probably, the chief disadvantage of cork is its weight and the fact that it will pick up and hold moisture in mechanical voids. I might say, however, that cork still has a good insulating value even with as high as 30 percent moisture content. I may get disagreement on that, but from our experience we are not too concerned unless the cork gets above the 32 percent moisture content.

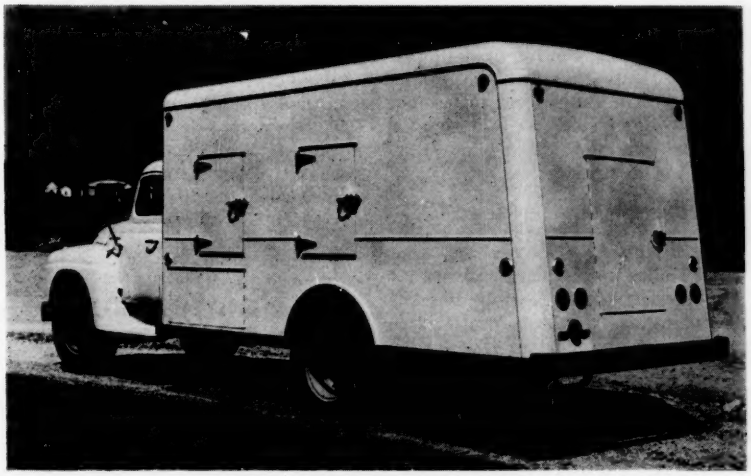
Styrofoam costs approximately the same as cork. The chief advantages, we think, are that it is considerably lighter than cork and it is a chemical product and definitely does not hold moisture. There are two disadvantages. It will disintegrate from heat. It also seems to be affected by abrasion. Rubbertex is another chemical product, and it has about the same advantages and disadvantages as Styrofoam. It has one additional disadvantage in the fact that it costs approximately twice that of cork or Styrofoam.

Floor Drains

We do not like the idea of floor drains because it is almost impossible to keep rubber stoppers in them. On an extremely warm day, the refrigeration loss (heat gains) through these drains is fantastic. So we build the door openings flush with the floor. Drainage is effected when the body is on an incline during the defrost cycle or washout periods.

Sidewalls and Roof

In the sidewalls and roof we use a glass fiber insulation, primarily for economic reasons. Most glass fiber insulation costs approximately three-and-a-half or four cents a board foot. An important feature of the glass insulation selected is that it



A standard refrigerated truck body designed for frozen foods.

Extracts of talk by T. J. Hackney, Jr., Hackney Bros. Body Co., Wilson, N.C. at the 13th annual meeting of the National Association of Hotel & Restaurant Meat Purveyors.

have proper resilience to give it stability to prevent settling in the side walls.

We can calculate the heat loss on any refrigerated truck body just as the heat loss on a storage room can be calculated. It is a mathematical formula and a relatively simple procedure. There are only two factors that we cannot control in designing a truck body that has the proper amount of insulation and the proper amount of refrigeration to do a good job. One is the product, and the second is the driver.

The Refrigeration System

In discussing these factors, consider bodies for low temperature with our present trend possibly towards frozen meats. If frozen meat that is only a plus five degrees F is loaded into a truck body, you are requiring the truck body to do a job of refrigerating the meat itself and not merely of holding the meat at the temperature at which it is placed into the body. It is absolutely necessary that the product be loaded into the truck body at at least zero degrees or lower.

The second item of driver discipline is the tough one and something over which operating firms or owners do not have too much control. About all you can do is to talk to your route men, salesmen or driver salesmen, and impress upon them the importance of maintaining refrigeration, and through such an educational program work toward establishing desirable conditions.

As an example, presume that a low-temperature body has a 50,000 Btu loss in a 12-hour period. Door openings and closures will add 50 percent to that figure, which means a 75,000 Btu loss. The choice of refrigeration resolves itself into a single mathematical problem. Knowing the heat loss you can figure the amount of refrigeration needed.

You can refrigerate basically by two different methods; either use a blower evaporator, or holdover plate or thin plate as the evaporator. In our opinion, for a straight route type operation a hold-over plate or thin plate evaporator is better than a blower operation. It is very difficult to control a blower evaporator with 40 to 50 door openings during the day, and it does definitely put overwork on the machine of the compressor. On transport work, for long distances such as from Miami to Chicago, the blower evaporator does a beautiful job, particularly in trailers.

The use of hold-over plates is merely a method of storing refrigeration. They use what is commonly called a eutectic solution, which freezes at a definite point. On low temperature work, the plate that we would normally use freezes at minus 8 F. It is, of course, imperative that these plates be frozen because when the solution is melted there is no longer any refrigeration.

There are, of course, routes where a hold-over system is not satisfactory, particularly for long runs of 12 or 14 hours. In these instances some over the road type of refrigeration should be considered. There are any number of over the road systems that are all good. There is the gasoline-driven type such as Thermo King and Arctic Traveler, which can be equipped either with blower evaporator or one-inch thick plates.

There are also systems with an auxiliary electrical standby, a system similar to cold trucks, which derives its motivating power from the drive shaft through a power take-off. It also has electrical standby for plugging in at night. The Coldmobile derives its motivating power from the fan belt. All of these systems work, and they all do a good job. Disadvantages are the cost and the additional maintenance, because you actually are maintaining two systems rather than one, which is the case in a hold-over type operation.

Pointers on Conversion of Coolers

A REPORT on cooler conversions, prepared by Paul B. Christensen, member of the Committee on Warehouse Operations, National Association of Refrigerated Warehouses, has been issued by the Association.

General: In multi-story buildings conversion should be from the top down. Placing freezers beneath coolers creates freezing problems on the floor of the cooler above — regardless of how well the insulation is installed between the two. With freezers above coolers the air space above the top of the pile in the cooler in general permits adequate natural air circulation to dissipate any effect of a cold ceiling in the cooler.

Insulation: Insulation in the cooler should be checked for soundness and for a proper vapor barrier on the warm side of the insulation prior to the conversion to a freezer. If both conditions are satisfied additional insulation may be erected against the old to bring the total to the desired thickness for the freezer. This thickness in general should be eight inches where exposed to outside conditions and six inches when between cooler and freezer. Where outside exposure also involves sun loads such as south and west walls or roofs, 10 inches of insulation is much more desirable. If a proper vapor barrier is not present on the existing insulation and cannot be applied without removing the insulation, the old insulation should be removed and entirely new installed.

Piping: Piping or refrigerating blower units will have to be increased. For freezer work a temperature split between coils and air should be a maximum of 10 F. Better still is a 5 F split, but if this is impossible, a compromise as close to 5 F as possible will be satisfactory. In most existing plants this means that the bare pipe cooling surface must be increased between 2 and 2½ times. With air units the same increase in general should prevail.

Engine Room: The engine room capacity should also be checked. Many existing engine rooms have sufficient capacity to take a small additional load, but where a large area is to be converted it is quite possible that added compressor capacity and condensing capacity will be required. It is best to have the engineer calculate the additional load and compare it with engine room capacity. Be sure that there is sufficient capacity to always have a spare compressor equal in size to the largest one in the engine room.

Doors: If the cooler doors are old and in general not too good shape, they should be replaced with new freezer doors. However, if the cooler doors are comparatively new and in good shape, it is quite possible that a set of new gaskets to make the door vapor tight will suffice. The exposed area represented by a door is such a small percentage of the total exposed area that a lack of insulation thickness in the door is a rather small portion of the total heat load.

Floors: If there are any worn areas on the floor they should be repaired before the conversion. It is very difficult to repair floors in a freezer.

Lights: If new aisle arrangements are to be used when the room or rooms are converted to freezers the lighting should be rearranged during the conversion to give proper illumination with the new aisle layout.

Elevators: Elevator shafts in freezers can be very troublesome because of condensation in warm humid weather. Precautions should be taken to thoroughly insulate the shafts where they penetrate areas converted to freezers.

The Control of Humidity in Refrigerated Warehouses

A REPORT on the control of humidity in refrigerated warehouses has been prepared by V. C. Stevens, chairman of the committee on warehouse operations for the National Association of Refrigerated Warehouses and issued in Bulletin form by the Association. The report follows:

The control of humidity in cold storage rooms has presented many different and varied problems. Here's what we have done: We built four units such as the one shown in Fig. 1. Dimensions are as follows:

Five feet wide, five feet high, and ten feet long. Each unit has five trays, made of two inch angle iron — hardware cloth and fine screen wire welded to the base of the angle to form a two-inch tray. Each tray holds approximately 600 lbs of S/V Sovabeads. S/V Sovabead in a chemically inert, solid, siliceous material in the form of beads of uniform size.

Fig. 2 shows the unit attached to a boiler used for reactivating the sovabeads. The heater is started off at about 150 F and the heat is gradually built up to about 325 degrees. The reason for this is that with the beads full of moisture subjecting them to a tremendous amount of heat causes them to crack open thereby diminishing their absorption ability and in some cases they become worthless after cracking up.

Trays of Sovabeads

Fig. 3 with one side of the unit open, shows the five trays which with the tray on top of the pressure chamber provides six trays of sovabeads holding approximately 3,500 lbs. Of course, during operation these sides are bolted down and the air is forced into the chamber at the bottom and up through the sovabeads and out at the top.

The fan shown in Fig. 4 is built to withstand approximately 500 degrees of heat. It is Model BG 35, produced by ILG Electric Ventilating Company, Chicago, Ill. One of these units is also used to rid a room of odors by putting activated carbon in the trays instead of the sovabeads. The reactivation is the same.

These units have been used for approximately three years now and they are doing a fine job says Mr. Stevens. They put them in the rooms for six to eight hour periods. It takes approximately three to four hours to reactivate one unit.

Smoke But No Fire

A WOMAN driver rolled down a car window to tell the truck driver in the adjoining lane that his truck was on fire and smoke was pouring from the back. "Dry Ice, lady," was his explanation.

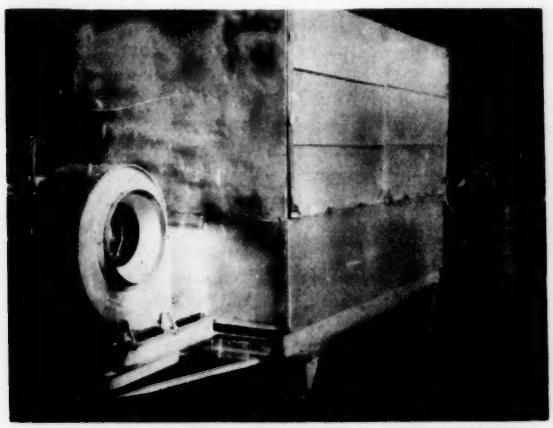


Fig. 1 — One of the units built to control humidity.

Fig. 2 — Unit attached to boiler reactivates sovabeads.

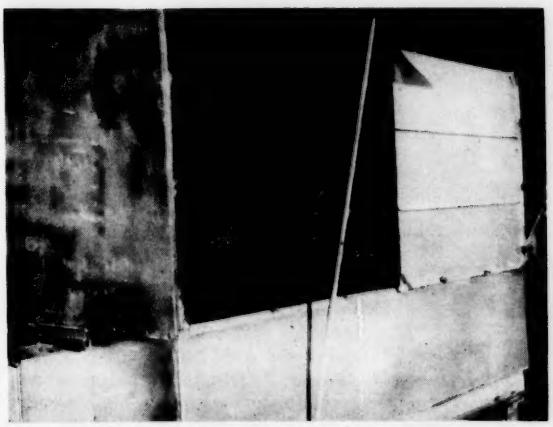


Fig. 3 — One side of unit open to show trays.

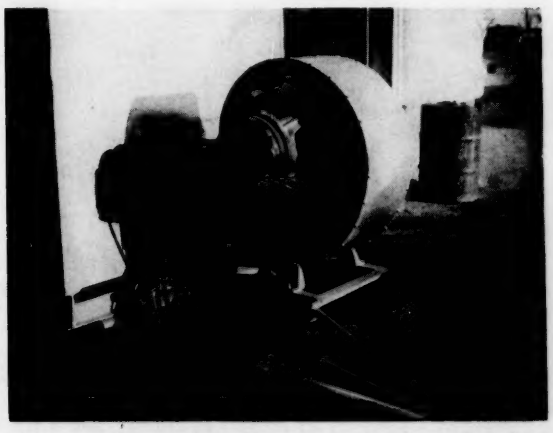


Fig. 4 — Fan used to force air over activated carbon.

Research Director Surveys Field of Refrigeration Research

GUEST speaker at the Chicago Section ASRE December 8 was H. C. "Dutch" Diehl of the Refrigeration Research Foundation. Principal portion of the Research Director's talk dealt with the functions of the Foundation. He explained the principal objectives of TRRF and its part in initiating, co-ordinating, reporting and recording research in the refrigeration field, with special emphasis on food preservation.

Mr. Diehl preceded his remarks with a short report on the International Congress of Refrigeration held a few months earlier in Paris, France. Europeans on the whole, he said, measure up to the Americans in their use and application of refrigeration except perhaps in the transportation of perishables where due to short distance between origin and consumer, the Europeans do not seem to have the same refrigeration needs as would the citizens of the United States. He did emphasize the fact that from the standpoint of interest, knowledge and energy expended in developing refrigeration as a science he felt that the Russians, more than any other nationality, very closely approached American standards.

Director Diehl's comments also related to his visits in Germany, Denmark and Holland with regard to research work such as that carried on by the Foundation. In particular he declared that here in the United States we are just beginning to concentrate more of our attention on humidities and gaseous conditions of food storage, whereas these three countries had attached growing importance to the climatic environment about the product and had already shown much progress in packaging materials for refrigerated storage purposes. He cited a private laboratory in Germany where the packaging industries, the biologists and food technologists, and the refrigeration warehousemen had already moved ahead of us in combining or pooling their talents for the common good. Mr. Diehl said he was impressed sufficiently with his European findings to recommend to TRRF Board of Directors that the Foundation extend grants to foreign groups for research in fields of mutual interest.

Objectives of TRRF

Three particular objectives were cited by the Research Director as the overall or long range ideals of the Foundation. First and foremost he explained that the fundamental purpose of the Foundation is to conduct research for the refrigerated warehousing industry. He informed the ASRE members present that the Foundation was actually started by NARW and gave a few insights as to the source of income (dues) and the types of grants made by the Foundation to encourage research.

He made available to those present, a copy of the Director's Report for the year 1954. In addition to the stated fundamental objectives of enlarging the fields of refrigeration, he pointed out that a second objective was to serve as a repository of information on the refrigeration of commodities. The third purpose stated was the objective of stimulating and interesting young people in the refrigeration industry.

Mr. Diehl pointed out particularly that the Research Foundation did not limit itself to conducting research for its membership, nor to the food industry alone. He cited as an example the research done by the Foundation on the refrigeration of storage batteries. He even cited how some research had been recently completed on the refrigerated storage of dates so as to provide a longer and more suitable marketing period of this commodity. Dates compared with other commodities took up a very small part of the Foundation's time but contributed in an important way to the overall welfare of the nation. The Foundation, he indicated, because it operates at a tax-free level feels that it owes an obligation to the people as a whole, and therefore extends its services outside of its own membership.

How TRRF Serves

Mr. Diehl then continued his convincing discussion on how the Foundation served as a catalyst, as the eyes and ears of project directors and interested industries, by citing a list of examples. He showed how a particular topic originated as a research item with the Foundation, what the initial findings were, and how the research project was carried on usually by a university or an industrial research group to its conclusion. He cited the shrimp industry as an example of how a grant by the Foundation to Louisiana State University has been a continuing project long after the Foundation's initial grant had been utilized. He covered the irradiation of foods projects now being undertaken by the Foundation, frost heaving and soil behavior, the enthalpy (heat content) of foods, and low temperature psychrometry.

Left: Director H. C. "Dutch" Diehl, TRRF, discusses ASRE program at Chicago with E. J. Robertson, Section Chairman at his right, and E. C. Ward, Program Chairman, at his left. Right: One of TRRF's research grants has been made to University of Illinois on the project of frost formation on refrigeration coils. Project Director W. F. Stoecker, University of Illinois Instructor, and a senior student conducting the work, are pictured with Director Diehl. They are Stoecker, Diehl and Fred Turk.

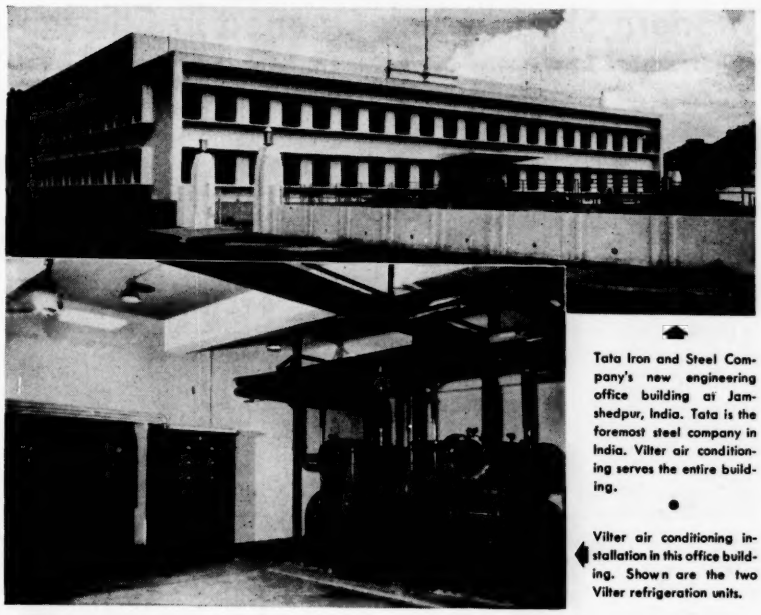
He also cited how one item of research quite often set up a chain of developments. Using the storage of peanuts as an example and the work of the Foundation with Dr. Woodroof of Georgia and the National Confectioners, he pointed out that this research led to a study of rations for the Army, to the study of condensation control in packaged materials and commodity packaging, and further led to a study of packaged canned goods (evaporated milk), and from there to the importance of packaging for refrigerated storage.

Industry Stimulated by Foundation's Activities

Director Diehl, in reply to some questions, pointed out that the Foundation often stimulates research on the part of industries which were a little reluctant to undertake certain research work themselves. After a little preliminary work had been accomplished by the Foundation, then industry decides it is well worth while, taking on and furthering the research itself. As an example he indicated that the dairy industry was a bit skeptical of the market possibilities of frozen concentrated milk. Since the Foundation initiated work with other university research units on this commodity, industry has indicated that it will be willing to pursue the matter to fruition. Another industry he cited was the baking industry. The freezing of bread was first handled by the Western Utilization Branch, USDA, at the suggestion of the Foundation. With indicated good results to be obtained from bread freezing, the American Institute of Baking has undertaken research on sweet bakery goods.

Fundamental Facts Sought

Under further questioning Mr. Diehl pointed out that the Foundation has rendered considerable service in determining the point of degradation of frozen foods and is now in a position to focus attention on all levels of distribution on the facts. This should result in the industry correcting its own shortcomings and should also be useful to regulatory bodies. By advising and counseling state or local legislative groups, the Foundation feels that it will avoid excessive demands on the industry which could conceivably be written into legislation, should there have been no Foundation or clearing house to serve the needs or inquiries of well intended regulatory bodies.



Tata Iron and Steel Company's new engineering office building at Jamshedpur, India. Tata is the foremost steel company in India. Vilter air conditioning serves the entire building.

Vilter air conditioning installation in this office building. Shown are the two Vilter refrigeration units.

Q - How do they beat the 110° F. heat in Jamshedpur, India?

A - with Vilter AIR CONDITIONING EQUIPMENT that costs less to own*

In Jamshedpur, India, summer temperatures that often soar to a bake-oven 110° F. are no problem to the engineering staff of India's largest steel mill, The Tata Iron and Steel Company. The company's new engineering office building has Vilter air conditioning that keeps the interior at just the right temperature and humidity.

Two Vilter condensing units are used. Each unit consists of one six-cylinder VMC compressor, oil separator, 60 horsepower motor and a two-pass condenser. Each unit is fully automatic and designed to deliver 60 tons of refrigeration. The smooth uninterrupted performance of this equipment has won the full approval of the Tata officials.

Tough climatic conditions such as those at Jamshedpur require careful engineering to provide the desired temperature and humidity conditions without causing a shock when entering or leaving the building. Combine long years of successful design experience with the industry's soundest line of equipment and you know why Vilter can custom build an air conditioning system to serve your special needs. Call on your Vilter representative or distributor today.

Sold and Installed by Universal Refrigeration Corp. Ltd.
Vilter Distributor in Calcutta, India

* Savings in low first cost are not the complete answer when considering the installation of refrigeration equipment. But savings in terms of years of extra service, reliable performance and minimum maintenance—that's where Vilter excels in low-cost ownership.

QUALITY CRAFTSMANSHIP that lasts . . .

ENGINEERING DESIGN that guarantees performance

Vilter REFRIGERATION and AIR CONDITIONING

THE VILTER MANUFACTURING COMPANY, Milwaukee 7, Wisconsin

Air Units • Ammonia & Freon Compressors • Booster Compressors • Baudelot Coolers • Water & Brine Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pipe Coils • Valves & Fittings • Pakice & Polarflake Ice Machines

Modern Skating Rink Opened in Chicago

New Tower Ice Skating Rink on opening day as seen from top of warming house and snack lod shop.

THE new Tower Ice Skating Rink, Chicago's most modern outdoor ice skating rink at Peterson and Kedzie, was formally opened to the public Saturday, November 26. The only one of its kind in this area, this kingsized mechanically refrigerated rink covers a surface 85 by 190 feet. The entire skating floor is enclosed by a three-foot standard hockey-type fence. Designer and contractor for the new $100,000 rink was the Burge Ice Machine Company.

The Commonwealth Edison Company, at a cost of $12,000 has completed the installation of additional power lines which were brought in from a two-mile distance.

Modern Refrigeration Unit

A 120-ton modern refrigeration unit has been installed in a pre-fab construction and, also, two 450-gallon per minute brine pumps which will circulate fluid through the Heinzelman patented Uni-Flo system. 46,000 feet of plastic tubing — or 8.7 miles of tubing has been laid and anchored which will have a capacity of producing a total of 16,150 square feet of ice.

Oscar Brotman, owner and operator of the rink, will incorporate an ice skating school both of which will be open to the general public. Particular attention will be given to teaching tots from 3 to 6, school age boys and girls as well as adults, the pleasure and fun of ice skating. Four certified skating instructors are under contract to direct the classes and private lessons to be offered to patrons and public.

Room for Spectators

Accommodations for spectators will be provided around the perimeter of the skating area. The present Snack Shop has been insulated and enlarged with the addition of the Warming House. This will offer a pleasant spot for hot drinks, sandwiches and friendly gatherings. Also, there will be a fully equipped skate shop for the rental and purchase of ice skates.

Year Round Center

The dream-child of Oscar Brotman, the new skating rink is on the site of the fabulous Tower Cabana Club which Brotman operated this summer as a private membership club. With the installation of the portable outdoor ice skating rink, a non-membership open to the public operation, this conversion will make the Tower Ice Skating Rink at Peterson and Kedzie a year-round entertainment center.

Delta States Ice Convention

A THREE-DAY convention of the Delta States Ice Association was held at the Buena Vista Hotel in Biloxi, Miss., December 4-6. Representing the National Association of Ice Industries were Guy W. Jacobs, executive secretary, and C. P. Austin, research and marketing.

Other speakers included W. F. Leonard Jr., The Southland Co., Dallas, Texas; Dr. H. L. McCracken, Baton Rouge, department of economics, Louisiana State University; and Tom Q. Ellis, Jackson, Supreme Court of Mississippi.

Officers

Offices were elected as follows:

President, W. L. Wood, Camden, Ark.

Vice-president, W. S. Moss, Baton Rouge, La.

Vice-president, Joe Harris, Jackson, Miss.

Treasurer, G. Thomas Frazier, Monroe, La.

Directors: Quinn Gautier, Pascagoula, Miss.; Tom Marks, West Memphis, Ark.; J. E. Todd, Grenada, Miss.

The convention closed Tuesday evening, with a "western roundup" program, banquet and dance.

Ice Delivery Trucks Kept Spotlessly Clean

THIS fleet of ice delivery trucks operated by the Southland Ice Company, Waco, Texas, is kept spotlessly clean, as a matter of good business. Safety charts at the left of the picture are being demonstrated by W. F. Leonard Jr. director of safety and insurance for Southland. Looking on are six of the key men in this fleet, including Ennis Boyette who is responsible for maintenance, care and appearance of these trucks.

These trucks of Southland Ice Company at Waco are kept spotlessly clean. At left a safety meeting is being conducted.

Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

Productive Maintenance Plans Supplant Preventive Programs

STAGGERING changes are taking place in American industry as the race for automation develops into a full-fledged contest for maximum production at the lowest unit cost. Advanced engineering and planning being done and carried out will more than double the industrial power requirements of this nation within the next 10 years.

Electrical industry, for example, expects to build as much electrical equipment in the next 10 years as it has in the last 75. Today, there are over 90 million kw of generating capacity installed. By the end of 1956 there will be 126 million installed based on equipment in production and on order.

In doubling the generating capacity in this country, there is created a real chain reaction. Power not only has to be generated, but it also has to be stepped up, transmitted, stepped down and distributed before it can be applied to your processes. At every step, this power has to be regulated, controlled, measured and protected. In other words, doubling the generating capacity of this country results in an increase of auxiliary equipment by 20-fold.

This will be a big task and responsibility for maintenance personnel.

Productive Maintenance goes far beyond so-called preventive maintenance programs, because maintenance of today's automatic equipment has to extend beyond any negative concept or approach to a point where it is fully as important as production itself. The General Electric five-step Productive Maintenance plan, in essence, advocates

1—the gathering of complete equipment data through an equipment inventory,

2—the determination of the extent of routine maintenance for industrial electrical systems,

3—establishment of a routine operating control system,

4—evaluation of the equipment for critical maintenance,

5—establishment of a critical maintenance program.

California Chapter No. 2, NAPRE, presented W. E. Cline, Manager, General Electric's Service Shop, Los Angeles, at their October 19, 1955 meeting on this topic of "Productive Maintenance". The paper presented here consists of Mr. Cline's introductory remarks and excerpts from General Electric's Productive Maintenance Bulletin GEA-6087.

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Los Angeles, Calif.
Secretary, J. R. Kelahan, Chicago 44.

Operating engineers of all refrigerating plants are invited to affiliate with the National Association of Practical Refrigerating Engineers, Inc., an educational association, "not-for-profit".

Modern Maintenance Plan Meets Industrial Needs

As automation becomes a reality, industrial management must take a closer look at the true cost elements in producing goods. The direct labor content of the finished products will become less and less as plants become more and more automatic. At the same time, invested capital for machinery, facilities, and equipment will increase tremendously. Depreciation of such equipment will reach a sizable proportion.

Another important element of cost which will increase tremendously under automation is maintenance. Intricate machinery and drives will require a carefully planned, well engineered approach to insure continuous operation. There will be some operations where the number of men in maintenance outnumber the men in production.

An element which is of utmost importance in the over-all profit picture is that loss which results from equipment failures. Downtime resulting from such emergencies is very costly. It is not uncommon for outages in some types of equipment to result in profit losses of thousands of dollars per day.

Naturally, as plants become more and more automatic the two largest items of cost which will affect profits are maintenance and downtime losses. In a continuous process operation, the failure of a key piece of apparatus may shut down the entire plant, which means absolutely no return from the invested capital. All emergency shutdowns cannot be eliminated, but Productive Maintenance can and will reduce such situations.

Typical Performance Plotted

Typical life expectancy of a piece of equipment would be somewhat as follows: Failure rate is high at first and then falls to a minimum. After this, many years of uninterrupted service can be expected. The failure rate then increases gradually. During this period, major overhauls should be examined closely. After overhauling, the failure rate drops to a minimum again for many years of continuous operation.

This high failure rate at first can be contributed to four factors; namely, design, application, human errors and manufacturing errors. When overhauling equipment, however, only two factors enter into the picture; human errors and installation. By this time, the application and design have been proven.

"Self Analysis" Suggested

Before Engineering and Management can adapt themselves to their industry's future needs, and while considering a Productive Maintenance program, they should take inventory of themselves. Only after they are aware of their present status can any plans for the future be evolved.

The best of maintenance has never produced anything—not a pound of

frozen foods nor a gallon of ice cream. Maintenance only makes sense in support of production. Both management and engineers have to learn to think in terms of dollars. Maintenance costs may be high, but they may not be high enough. On the other hand, they may be low and yet not low enough. Maintenance dollars have no meaning by themselves. The only true measure of maintenance has to be — the maintenance costs per unit produced. The task ahead is big. Unless your firm plans and acts on it now, it will outgrow your organization from year to year.

Productive Maintenance Plan

Outlined hereafter are the steps to follow in organizing a new maintenance program. All five steps should be developed in the sequence given if they are to work properly.

STEP 1 GATHER COMPLETE EQUIPMENT DATA

An equipment inventory will form the basis of your Productive Maintenance record system.

First step in controlling maintenance costs is to conduct a survey of all the electrical equipment in your plant. You have to know what you have and where it is.

To properly identify each unit, an inventory number must be assigned. Usually, a number system is used that indicates building, floor, and machine number. The number is put on the equipment or machine in a prominent place.

Simplify your equipment inventory by using record sheets or cards listing general data desired, and the special information you need. Mechanics or trainee engineers can then fill in these sheets. In some plants, a maintenance clerk makes the inventory. In this way, he can become familiar with all equipment. Then, when the program is in operation, he will be more able to handle the various clerical reports relating to the equipment items. The plant engineer should also review the sheets—he can add any additional data necessary before the permanent record is made. (In many cases, the plant engineer is the custodian of these records).

Complete Data Is Necessary

A complete and well-edited record sheet or card should include a description of the equipment; application; rating; serial number; manufacturer; vendor or agent; purchase order number; cost, rating and machine or equipment number. Space should also be provided so a record can be made of the original location of the unit and all subsequent changes.

These cards can serve as plant property records, or, if separate property records are kept, can supply the basic property record data. This includes the identification of the equipment as well as the original and installation costs.

MANAGEMENT

Check yourself and your organization for some of the following items:

1. Is your maintenance man a perfectionist to the extent that the best way is barely good enough?

OR, does he compromise with production and make repairs accordingly?

2. Does he save nuts, bolts, and all kinds of scrap hoping to use them sometime in the future?

OR, does he figure that the cost of saving it or the rental on the space it occupies outweights its value, which in many cases is unknown to him?

3. Does he love to comply with orders, particularly if they are written out?

OR, does he analyze them from an economical standpoint and make necessary recommendations?

4. As managers, do you recognize the necessity of maintenance?

OR, look on it as a necessary evil?

5. As accountants, are you able to account for maintenance costs as accurately as those of material and labor?

6. As purchasing agents, do you buy, for instance, an open type motor because that is all the application requires?

OR, do you consider that for a small price differential you could purchase an enclosed motor that might be used as a spare for some motor in a critical operation?

7. As production men, do you overspeed, overload and run machines beyond their rating?

OR, do you consult your maintenance man for his recommendation on operation?

STEP 2 DETERMINE EXTENT OF ROUTINE MAINTENANCE

Decide how much care is warranted by the importance of the equipment.

Objective here is to determine—not the greatest—but the best or most desirable amount of maintenance required. Include only those items where Productive Maintenance will pay, or help make workers safe. Anybody can do a complete maintenance job—but that is unnecessarily expensive.

In some cases, it is cheaper and will do no harm to replace or repair a part after it wears out, rather than to apply *Productive Maintenance* to it. As an example of this thinking, if several operations are dependent on a single chilled water pump, the need for *Productive Maintenance* is evident.

However, if the load of this pump can be picked up elsewhere, the need definitely is not as essential. Equipment that is not considered important enough to be brought into the *Productive Maintenance* plan, such as front office air conditioner, drinking water fountain, etc., can be repaired in answer to non-scheduled requisitions.

STEP 3 ESTABLISH A ROUTINE OPERATING CONTROL SYSTEM

Set up inspection schedules, work orders and cost records, and a renewal parts stocking system.

Set up an inspection cycle that strikes a balance between "too often", with resultant waste of money, and "not often enough", with the possible damaging outages.

The repair record will tell if more attention is needed. Ask maintenance personnel to note on their check lists or report forms whether the frequency can be cut down.

Proper Reports Build Greater Control

Inspection reports must be made in writing. This report must then be analyzed to determine material re-

quirements, labor requirements, and estimated time necessary for completion of each job. With this analysis, the engineer or foreman can then set up proper maintenance schedules for his crew. He can place orders for the material required. If additional manpower is necessary, or if repair periods must be discussed with operating personnel, it can then be arranged.

The sample record (Fig. 1) shows one way of assuring proper inspection scheduling. Colored tabs at the bottom of the record can serve as a "tickler" to schedule inspections.

Develop Work-Order Program For Routine Maintenance

There is no such thing as a universal work-order program. Each plant has to develop its own system—but each plant can benefit from patterns and systems used elsewhere. In other words, the details must be individually tailored to the individual plant, but the basic purposes are common.

Streamlining your work-order system can have a striking effect on maintenance costs. A work order is actually a bid for action. But there is a great deal of information that must be included. This basic data is organized as follows:

Job number
Job location
Department number for charging purposes
Craftsmen required
Urgency of job—date required
Description of work required
Cost estimate—labor—material
Cost actual—labor—material
Approval spaces

Work orders should include only essential information, and should be clear and concise. They should be complete enough so that additional inspection is not necessary prior to

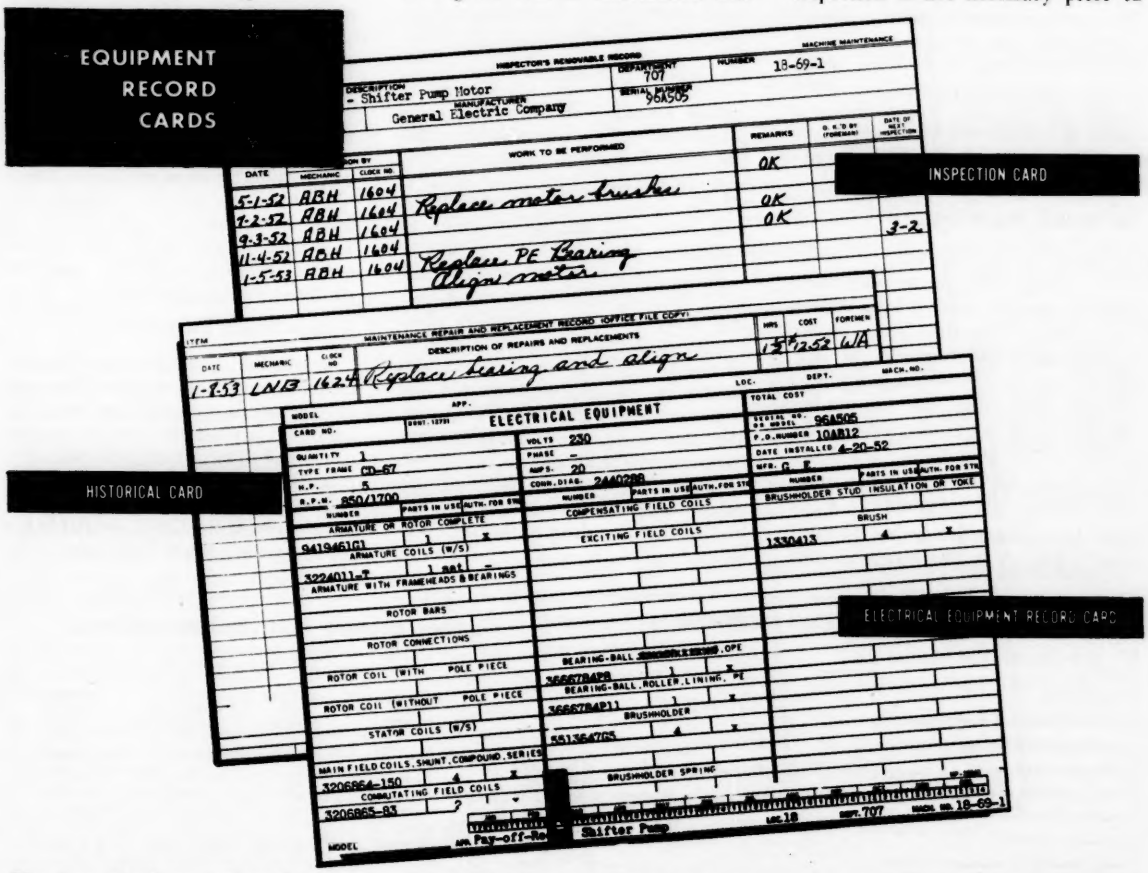


Fig. 1 — Equipment Records Cards

A good record system is the key to a successful Productive Maintenance program.

Basically, the system used should contain: Equipment or machine number, Application information, Purchase and installation information, Rating information, Renewal parts information, Inspection instructions.

In addition, any card system used may be valuable in several other ways: (1) They can serve as plant property records, or can supply the basic property record data. (2) In event of disaster, these records may be valuable for insurance purposes. (3) The historical record card serves as a history of past maintenance cost so the suitability of the equipment can be judged. Misapplication, overage and poor quality can be evaluated to obtain less maintenance and downtime. (4) A check can be made from the equipment card to the parts stock cards, to make sure proper parts are available to help protect continuity of the equipment operation. (5) The location of the machine is valuable as a means of keeping track of equipment. This is particularly valuable for spare and movable equipment. (6) Engineering data is readily available and plant engineers can operate on a well-informed basis. (7) The inspection card permits constant, cyclic inspection which is easily modified to the inspection needs of the equipment. (8) The proper inspection cycle and resultant reduction of breakdowns reduces the number of work-order requests from production.

Sample record cards shown in this figure are used through the courtesy of Remington Rand Company.

actual work. By indicating the date when the work must be done, proper scheduling of men and material can be accomplished.

The number of copies of the work order will vary from plant to plant. A typical job order form might have an original copy for the worker; a duplicate for the superintendent; a triplicate for the maintenance control clerk to be used as a costing copy.

The work order is often used to indicate to the man performing the job the safety precautions that should be taken, such as de-energizing equipment, before performing any work. The maintenance worker is always faced with the production department's reluctance to stop the equipment—and if this information is included on the work orders, the argument is transferred from the maintenance and production men to the supervisory level.

No Order, No Work

The first rule in any work-order system is this: all work done by maintenance must be covered by a written work order. Experience has shown that when written orders are neglected, work is often called for that is unnecessary, improper, or that has already been requested. Or sometimes, orders are issued for work that should be done at some other time because the proposed work related to a larger job being planned somewhere. A written request lets you screen out unimportant or unnecessary work. After verbal requests have been turned down a few times, people will stop making them. A written request will establish responsibility, help prevent mistakes or misunderstanding about what is to be done, and provide the data necessary to accumulate costs.

Of course, in cases of emergency, it may be necessary to make the order out after the work is started. But in all cases *make one out*. In the case of standing work orders applying to routine maintenance, be sure that these orders are actually limited to this type of work and do not become catch-alls for jobs which should have their own separate orders.

Costing Is Important

Cost estimates and actual costs of maintenance provide a way to control the cost of services rendered. Only with an estimate can the need for a job be evaluated, and only with actual costs can the performance of equipment be appraised.

What about material costs on each job? Here again, the degree of control must suit the individual plant requirements. In general, however, all major material for a specific job should be charged against that job order. On the other hand, it is usually not worth while to cost stock items such as nuts and bolts—rather, for them, a percentage factor can be used to load all work orders with the cost of this standard authorized material.

The historical card is a record of upkeep costs—material and labor—of the equipment (See Fig. 1). Many companies use this type of card to maintain the cost record and others prefer to file an actual copy of the costed work order. These work orders are usually thrown away after periodic review.

Inventory Control System

Objective here is to make the money invested in inventory work to the best advantage.

First, find out how to control renewal parts stocks. It is an important job—and one that keeps getting tougher.

Each year, improvements and new construction make it necessary to install more and more complex electrical equipment. In turn, you must stock a growing variety of relays, solenoids, limit switches, timers, electronic tubes, and other parts. These new additions do not displace existing stock; rather, they add to it. You must be constantly alert if you are to prevent inefficient stocking conditions.

Watch Stock Turnover

Remember, for every part there is an optimum turnover point. The cost of acquisition should be carefully balanced against the cost of possession. Too fast a turnover will also penalize you.

Set up a plan that will make renewal parts immediately available for routine maintenance and repairs. To

EVALUATION OF PLANNED OVERHAUL REQUIREMENTS

DATE_____

LOCATION_____ DEPARTMENT_____ MACHINE NO._____

MACHINE RATING_____

AGE SINCE INSTALLATION OR LATEST OVERHAUL_____

OPERATING CONDITIONS (ATMOSPHERE-TEMPERATURE)_____

HOURS OPERATION PER DAY_____

ELECTRICAL CONDITION READINGS_____

CONDITION OF INSULATION_____

MECHANICAL CONDITION_____

POSSIBLE RETIREMENT OR REPLACEMENT OF MACHINE_____

PRODUCTION TIME LOST FOR PLANNED OVERHAUL	TOTAL DOWN-TIME COST	COST OF PLANNED OVERHAUL	TOTAL PLANNED OVERHAUL COST
_____DAYS	$_____	$_____	$_____

PRODUCTION TIME LOST IN EVENT OF MAJOR FAILURE	TOTAL DOWN-TIME COST	COST OF REPAIR & PARTS	TOTAL FAILURE COST
_____DAYS	$_____	$_____	$_____

EVALUATION OF CRITICAL PARTS PROTECTION REQUIREMENTS

(The Evaluation is based on the failure of a part which requires the longest repair time such as armature coils)

	NO MAJOR PARTS STOCKED	ARMATURE COILS STOCKED	COMPLETE ARMATURE STOCKED	COMPLETE MACHINE STOCKED
REPAIR TIME	10 days to make coils X	6 days to rewind armature X	7 hours to install new armature	3 hours to replace motor
TOTAL DOWNTIME COST	$168,000	$100,800	$4,900	$2,100
COST OF PARTS PROTECTION	0	Coils: $4,664	Armature: $25,600	Motor: $46,000
COST OF REPAIR	$12,730	$5,900	Installation: $850	Installation: $360
TOTAL FAILURE COST	$180,730	$111,364	($31,350)*	$48,460*

*Fig. 2 (left) — Suggested chart for comparing production time lost in planned over-hauls with production time that could be lost in unforeseen breakdowns. Fig. 3 (right) — In this particular case history, the motor involved was a 500 hp slow-speed d-c motor. The problem was to determine how much an armature failure would cost. Down time was estimated at $700 per hour. Based on this evaluation, owner decided to stock a complete armature for best protection. (*Add disassembly, assembly and transportation time to actual repair time. *Add repair cost, on straight time basis, of failed unit).*

control the stock problems outlined above, the mechanics of a typical inventory card system must be clearly defined. A properly organized inventory card system will obtain optimum turnover rates on all items, help prevent overstocks or understocks, avoid obsolescence losses.

Watch Costly Duplication

Duplication of stocked parts is very difficult to control. In many cases, the identical part is sold under different numbers by different suppliers. The most practical solution is to be constantly on the alert for duplication. Cross-reference part numbers and maintain stock under one number.

In purchasing renewal parts, the best practice is to buy from the original supplier of the equipment. By doing this, the parts are usually of the equipment quality and the original equipment supplier has a greater interest and responsibility in the equipment operation.

STEP 4 EVALUATE FOR CRITICAL MAINTENANCE

Decide what equipment has vital operating importance. Then determine its condition—and its cost of failure.

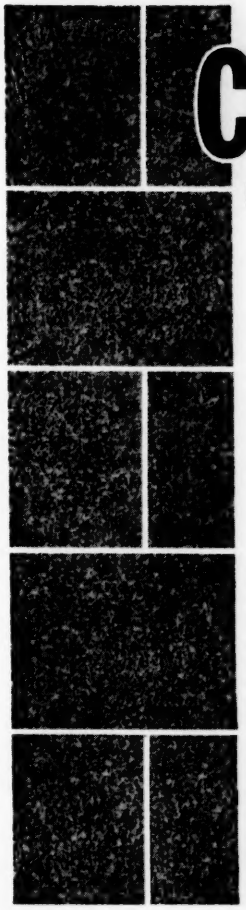
Equipment can be considered "vital" if its failure directly or indirectly interrupts or delays production. This condition is appraised by such things as high percentage of utilization, or lack of by-pass equipment. The chart (Fig. 2) will help compare total planned overhaul cost to the total failure cost. Set up this list of equipment in order of critical importance.

Determine Condition of all Equipment on Critical List

Ask equipment suppliers to help make this initial inspection of critical units. Take advantage of their wide experience with equipment under every type of operating condition.

Consider the age of each critical consider a machine that has operated 20 years since the purchase to be a haul. Certain insurance companies machine since purchase or latest overpoor insurance risk.

After learning the critical importance of each piece of electrical equipment, and its condition, the next objective is to find out which special maintenance parts are needed to stock as "insurance" to protect highly critical equipment—parts whose use cannot be predicted, such



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- Corkboard has no capillary attraction for moisture, hence doesn't rot, swell, warp or support bacterial growth.
- Corkboard is fire retardant; insect, vermin resistant.
- Corkboard is structurally strong, yet flexible—saves space.
- Corkboard is light in weight; installs easily, works like lumber. Bonds tightly with cement, paint, hot or cold asphalt.

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as spare armatures, large coils, complete motors and devices, etc. Here's how (See Fig. 3):

(1) First, decide which parts are most subject to failure. Next, calculate repair time under the following conditions assuming major failure:

a—No major parts stocked
b—Some major parts stocked
c—All major parts stocked
d—Complete unit stocked

(2) Determine cost of repair and inventory cost for each of the possible conditions.

(3) Total this information to determine the total "failure cost."

(4) Analyze total cost of each condition to determine what you must stock to protect the equipment.

STEP 5 ESTABLISH A CRITICAL MAINTENANCE PROGRAM

Now take the action step—set up your critical maintenance program.

Which parts are most important? Get them first. Then organize your budget so that you can purchase the rest of your critical stock on a planned basis. Remember, too, that your critical equipment demands a more rigid schedule of inspection and service. Maintenance schedules must be more complete, and you must keep closer records of all operations, failures, maintenance and operating costs.

Schedule Planned Overhauls For All Critical Equipment

Planned overhauls should be scheduled well ahead, so all the necessary men, tools and material for the renovation can be made available at the proper time. Overhaul can be set for normal down time, vacation closings, holiday shutdowns, or for off-season production periods. The objective should be to disturb production the least amount possible.

Planned overhaul is effective after equipment has operated over a reasonable service life. It works this way: On a systematic basis, you should remove the equipment that needs overhaul most or is most important from operation for complete rewinding, rebuilding, or modernizing at the most favorable time for production purposes. These planned, short-term outages consume far less time than the unplanned shutdowns they eliminate or minimize. As a result, the gap between actual and theoretical maximum production on the part of a machine is narrowed.

The probable retirement or replacement of every piece of critical equipment should be considered in this step. This means that product on requirements must be projected into future years. If the anticipated usage of the equipment is only for a short period, it may be good judgment and economics to assume the risk of operating over that period without overhaul, and depend entirely on inspection and routine maintenance.

Fig. 4 — Refrigerated warehouse engineer surveying equipment with chief electrician and maintenance foremen, the first step in establishing a productive maintenance system. The engineer holds a folder containing machinery record, maintenance history, spare parts list, and most recent work order cards. This motor-generator set was not placed on the productive maintenance list as a duplicate unit is available at all times.

Budgeting

A well-controlled budget is essential to a successful Productive Maintenance operation. Dollars needed for the various phases of maintenance can never be projected with 100 percent accuracy. It is always necessary to maintain a certain amount of flexibility. A major breakdown will result in the over-spending of the budgeted amount of "unpredictable work". In a case such as this, it will be necessary to reduce the amounts allocated for other activities.

By putting the over-all requirements and benefits before management, clearly, concisely and graphically, the engineer can present this request for working dollars with considerable assurance of success. Also, management is placed in the position of either accepting the recommendations or assuming a part of the responsibility for future breakdowns.

Management Reports

Management will support Productive Maintenance only when it can gage performance. Management regularly receives reports on production performance. Reports covering maintenance are more difficult—the better the job done in preventing trouble, the less there is to report. The only thing that can be done is to report activity and let the continuity of operation of the production equipment determine the efficiency of the maintenance operation.

Employee Training

Will it pay you to have a training program? The answer is usually "yes". Here is why: As equipment has become more complicated, craft specialization is a more common practice in most plant operations. A plant can benefit by having good maintenance of equipment by specialists, but there can be the usual drawbacks common to specialization. Knowledge of crafts other than the specialized one would foster the recognition of trouble symptoms in other craft fields, and the consequent passing on of these troubles to other craft foremen. Having representatives of your suppliers lead discussions should be considered. They are usually only too glad to do so—not only do they want to demonstrate the quality of their equipment, but they know that proper maintenance will result in a better record for their equipment.

Ice Cream Plant Addition

PLANS for a $20,000 addition to the Arctic Ice Cream Co. plant at Seattle, Wash., have been announced. The two-story wing will be 40 by 120 ft.

News Notes and Chapter Activities

San Francisco

GEO. FERRY

CALIFORNIA No. 1 met in the 2nd floor banquet room of Bruno's Restaurant for its November 14 meeting. Election of officers took place. They are for 1956: President, Henry Guilmette, Pacific Scientific Co.; 1st Vice-President, Chas. Stewart, Golden State Division, Foremost Dairies; 2nd Vice-President, Lewis Brooks, Carrier Corp.; Secretary, George H. Ferry, Plant Asbestos Co.; Treasurer, Allan M. Ballard, Robt. B. Holland Co.; and Sergeant-at-Arms, Marshall T. J. Garlinger, USMSTS, Pacific.

Our educational program presented Bob McKee of Pacific Fruit Express Co. giving a summary of his paper on "Automatic Ice Plant Operation", which he presented at the National Convention in Los Angeles. Principally, Bob described the 400 ton PFE plant at Laramie, a new installation, plus conversions at Roseville, Omaha, Ogden and Los Angeles, which gave those plants automatic-operation.

The October meeting was in the nature of a field trip to the O'Connell Trade School, consisting of checking this school's facilities for teaching refrigeration and allied crafts. The school has a very elaborate and expensive shop, complete with all tools of the trade, several full-scale operating pieces of equipment, walk-in box, etc. At this October meeting was concluded the convention fund raising, which was somewhat in vain since San Francisco was not selected as the 1956 Convention site. Winners of the rotisseries were J. J. Phillips, Ernest Hess, and J. H. Hutchinson.

Denver

MARCUS FLORIDA

ELECTION of first permanent officers was held November 2, 1955. They are: President, Mike Bistranin, chief engineer, Safeway Stores Distribution Center; 1st Vice-president: Al Nazarenus, chief engineer, Beatrice Foods; 2nd Vice-president: Dean A. Dungan, field erection and service engineer, York Corp.; Secretary-treasurer: Marcus Florida, 1st engineer, Safeway Stores Distribution Center; and, Sgt.-at-Arms: Charles Beals, shift engineer, Beatrice Foods Wynkoop plant.

The board of directors are to be elected at a later meeting so that there will be a better cross section of membership representation heading up the chapter. The president appointed Herbert Nelson as recording secretary.

There were five new members taken in at this meeting. They were Walter Carbaugh, Denver Dry Goods, Milton Strodtman, Denver Dry Goods, John Richmond, National Food Company, Delano Walcutt, Pepper Packing Co., and Morton Heathman, Safeway Stores. We also passed on the memberships of William Spurvey, George Frantz, Albert Conroy and Gerald Hoekstra. We also came up with a wrinkle to supply the future meetings with coffee and doughnuts. It may be that it could be of value to other chapters.

No educational program was presented on November 2, although some questions and answers were undertaken. We will endeavor to answer the questions ourselves, but those that we are unable to answer we will forward to the national office.

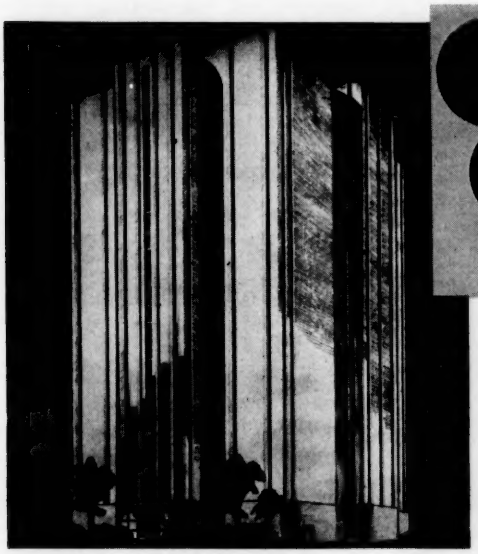
The first educational class was held at the November 25 meeting, based mainly on the first chapter in Basic Refrigeration. The class was conducted by Mike Bistranin. Discussion centered around heat and methods of heat transfer. There was a gratifying amount of participation from the members, showing that there was a great deal of interest in the lesson. There were several experiments conducted with dry and water ice, and liquid "Freon". If not too successful in fact, they received a good deal of laughter, so they weren't complete failures.

Pittsburgh

OTTO KNOCH

THE Pittsburgh chapter held its monthly meeting on October 27. It was called to order by President Paulmier with all other officers in attendance. The minutes of the previous meeting were read and approved. The special order of business was to get the reaction of the members as to what kind of meetings they desire in order to

(Continued on page 39)



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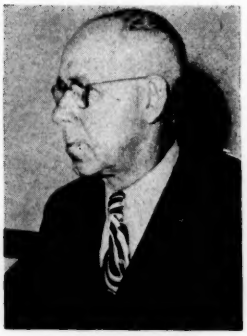
From the President's Desk

Membership, Conventions, and New Education Post Receive President's Attention



Leroy Etzel

CHAPTERS are in a position to steal the membership drive initiative from the National Committee in January. It takes time for the new chairman to get oriented, to get to know his assistants on the committee, to get his ideas into the National Office and then in print to the chapters. Locally, chapters have a smaller, closer knit, group who are ready to roll with the signal "all clear ahead".

Well, the right-of-way is clear. Our objective in the first half of this term is more members from the dairying and ice cream manufacturing industries. Don't wait on orders from the National membership dispatcher.

Proceed with a campaign in these industries, now. When leads are supplied by the national representatives, compare your list of prospects with theirs. Not only see if you can top their list, but be prepared to inform the national committeemen just how many of these prospects are already signed up.

Where do you look for leads? Some of our newest chapters have gotten the best results from the classified pages of the local phone directory — an idea so overly simple, that some of us with the more established chapters wouldn't want it known that we overlooked it. Make up a list of dairies, creameries, cheese processors, ice cream plants. Then check it against your membership rolls.

Enlist the help of members from the milk process industry. Go calling. Calls will get results. Obtain the services of a dairyman engineer and honor the industry at one of your meetings. Invite management, too, and let them see how your chapter program functions.

The chapter which helps itself by membership initiative, aggressive campaigning, and dogged follow ups on prospects, will probably help itself to one of those three trophies. Just ask Tacoma! They know. See how proudly Archie L. Waterbury displays that E. A. Brandt trophy. His picture is on page 39.

Convention Glances

Detroit is the setting of the 1956 NAPRE convention, the 47th annual meeting. Tentatively, Michigan Chapter No. 1, the host, has selected the Statler as headquarters. The dates are November 5 through 9. That will be the week of National Election for the President of the United States and members in both Houses of Congress. Therefore NAPRE's president reminds all members who plan on attending the Detroit convention to mark their 1956 calendars accordingly and arrange to cast absentee ballots.

National Director Roy T. Burns has been appointed as the general chairman for the 47th convention. Director and past president Regis Gubser, the Educational chairman, Harold P. Hayes, and vice-chairman Guy R. King, the National office, and the Detroit Educational Committee, are already busy preparing the program for this event. Some practical innovations or precedents are expected. Local accommodations, social, ladies, and other committees are to be announced as they are appointed by Charles Heemstra, Detroit's president.

Los Angeles Retrospects

Like the best planned affairs, some little accident always arises to upset the happiness of those in attendance at our conventions. The NAPRE convention at Los Angeles was no exception. The purse of Mrs. John W. Neff disappeared during one of the ladies' sightseeing trips. Honorary member and past president John W. Neff expresses Mrs. Neff's appreciation and his own over group replacement of their financial loss:

"Thanks to our many friends at the convention who were interested in sharing a small loss instead of a large one by Mrs. Neff. Mrs. Neff and I have always said that we had a lot of friends in NAPRE. Again, this incident proves that to be a fact. We certainly appreciate the friendly spirit which the Association members, individually and collectively, remembered us. Mrs. Neff joins me in sending our thanks and kindest regards."

When retiring president Regis Gubser announced the winners of the new chapter contest and presented the gavel trophies, many of the delegates missed a little history in connection with the wood from which the gavels were manufactured. Gubser had finished the gavels himself in his own workshop. The piece of mahogany from which the gavels were made was cut from a handrail of an old sailing vessel which had been shipwrecked off the coast of Florida about 1870. It had been passed on to Gubser by his grandfather, who had been a cabinet maker. He always hoped to make something worthwhile of the mahogany and felt that this would be an appropriate use for it. It was fitting indeed that one of the gavels went back to Tampa, Florida, where it was hoped that it will be in use for many years to come.

This additional division of responsibility had been requested of NAPRE's Board of Directors by Harold P. Hayes, Chairman of the Educational Committee. The Board designated Gubser as the official director and representative on the board. Hayes was re-elected at the 46th convention as chairman and Guy R. King as vice-chairman. Johnson will carry the title of assistant chairman. Like Hayes and King it is expected that he will be assisted by six or more sub-committeemen in his particular assignment. Chapters are invited to nominate qualified members for the additional berths on this committee.

Johnson Receives Appointment To New NAPRE Educational Post

NEWEST educational assistant, Elmer A. Johnson, was appointed by Educational Director, Regis Gubser to set up a new division responsible for the examinations and administration of the Certificate of Proficiency program. Johnson, field engineer to Westinghouse Electric Co., is a member of the Los Angeles Engineering Board of Examiners and an instructor at the Frank Wiggins Trade School of that city. He is also one of three instructors in California Chapter No. 2, NAPRE, (the other two being Guy R. King and George H. Paulick).

L. Etzel

build up the attendance. Letters sent by National officers and Chairmen Guy King, S. Averell Cole, Richard Kelahan and Regis Gubser were read and the information was well received by the members. The next order of business was the election of officers. The new officers are: President, Alfred Lossing; Vice-president, Clyde Dalton; Secretary-treasurer, Otto Knoch; and, Sgt.-at-Arms, James Crenner. We had one delegate, James B. Moore, who attended the National Convention at Los Angeles, Calif.

Colton

HARRY BONTER

OUR October 12 meeting was held at the Santa Fe lunch room with the usual business session. A new member Douglas E. Philipps from Orange, Calif., was accepted. The meeting was conducted with the usual lecture class, and several questions put by the members on refrigeration and operating plants were answered. Our November meeting was held one week early on the 2nd, to accommodate the schedule of the convention. Color motion pictures taken by L. H. Benedict of the 1954 trip from Los Angeles to Chicago, then to New Orleans, were shown. We also had a reel of color pictures of the 1948 convention at New Orleans, taken by Secretary H. O. Bonter. Both meetings closed with the usual lunch and awards.

Tacoma

CLAY HUNTINGTON

WITH the Brandt Memorial Membership trophy in their possession for the first time, members of Washington (Tacoma) Chapter No. 2, have vowed to retain possession as long at least as did New Orleans from whom they won the coveted plaque this year. New Orleans held the Memorial Trophy for three years until the Tacoma chapter, with a membership increase for the past 12 months of 22 (from 32 to 54) wrested it away.

The plaque was returned to Tacoma from the Los Angeles convention by Archie Waterbury, chief engineer of the Heidelberg Brewing Co. of Tacoma, and a delegate to the parley. Waterbury also was named a member of the National Education Committee for 1956. John Moyer of Tacoma's Hooker Electrochemical Co., is president of the chapter.

Archie Waterbury, Chief engineer of the Heidelberg Brewing Company of Tacoma, Wash., exhibits the Brandt Memorial Plaque, possession of which was won by Tacoma Chapter for greatest percentage increase in membership during the year 1955. Waterbury attended the Los Angeles convention as a delegate from Tacoma and was named to the Association's national education committee for 1956.

Memphis

CHAS. CONLEY

AT THE chapter meeting of October 5, J. W. Morrison, factory representative, Worthington Co., gave a talk on the application of refrigeration to air conditioning (it was not a technical talk nor did it describe any equipment). He stated that air conditioning had made it more comfortable for folks when they did their shopping and buying, traveling, at their entertainments and at work. By the Jones' having air cooled homes, it has caused the Smiths' to do likewise. He named a lot of applications of air conditioning, which is practically applied to most any thing.

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Jimmy Worrell, assistant engineer, Hotel Chisca, was elected to membership at this meeting. At the November 2 meeting, M. C. Garner, assistant engineer, Hotel Claridge, and A. D. McCarver, engineer, John Morrill Packing Co. Branch House, were elected to membership.

H. L. Todd talked on Chapter No. 2 of Basic Refrigeration at the first November meeting. He explained various types and kinds of refrigerants, by using small quantities of actual refrigerants. He had a small compressor operating, explained its operations, showed how the condenser pressure went up when the water was cut off and how the suction pressure went down when the expansion valve was closed.

At the second meeting of the month Todd continued use of the small compressor in actual operation to put over his talk. He was followed by John H. Robinson, chief engineer, West Tennessee T. B. Hospital, who showed a colored moving picture of a young boy being operated on to close up his diaphragm as he was born with a hole in it. The patient's intestines had gotten through the hole and kept his lungs from working. Ice was used to control the blood and help with keeping him asleep, as the operation lasted eight hours.

Outstanding Members Die

Tennessee chapter has lost two of its old members in November. James M. Sutton, an honorary member who was the chapter's instructor for 12 to 15 years, died on November 14. Capt. Rees V. Downs, died November 20. He was a member of the chapter for 25 years or more. In his early days he was very active.

Lt. Com'd'r James M. Sutton was commanding officer of the Seebee Naval Reserve Unit at Memphis and a widely known electrical engineering consultant. Born in Chattanooga, he attended school in Memphis and received his degree in electrical engineering from Georgia Tech in 1923, being one of the top men in his class. He went into the Air Force after his graduation and was one of the pilots of the old Jennies. In World War II he served as a lieutenant commander with the Seabees in the Pacific.

He did research in the early development of electronics in Schenectady, N.Y., for General Electric for two years and then was transferred to Memphis as the firm's heavy duty representative. A brilliant man, Mr. Sutton contributed to the design of generating systems in the TVA projects including Wilson Dam. After resigning from General Electric in 1932, he opened his own consulting engineering office in Memphis. He was a member of Lindenwood Christian Church, a Mason and a Shriner. He leaves his wife, Mrs. Esther Carr Sutton; his son Tommy Sutton and two daughters, Mrs. Robert Cullen and Mrs. James Litchfield.

Rees Vernon Downs, one of Memphis' most widely known and colorful longtime rivermen, who was also active in civic and church affairs, died at 77. He was a partner in the Combustion Equipment Co. and representative of the Chick San Co. of Brea, Calif., but most of his interesting career centered on the Mississippi and its tributaries. Pilot and master, he had captained many boats on the river, including one season as master of the famous old river side-wheeler, the Kate Adams.

In addition to NAPRE, he was a charter member of the Propeller Club and member of the Pilot Club, the Engineers Club, Memphis Chamber of Commerce, the Presidents Club of Kansas City, and the Royal Arch Masons of Pine Bluff. He was an honorary senior warden and member of the Vestry of St. James Episcopal Church and was director of the University of Practical Living at the church. He was a bachelor.

Tampa

MARTIN SMITH

ON SUNDAY, December 4 at 2:00 p.m. the members of the Tampa chapter assembled at the Southern Brewing Company and made a tour of the premises. They had been previously instructed to bring their copies of BASIC REFRIGERATION with them and to refer to the flow diagram of a brewery therein; also to bring paper and pencil in order to make notes. The tour started on the 4th floor, the following route taken and this equipment observed:

Fourth floor: malt mill, malt storage, hot and cold water storage, kuhlschiff room and brine tank. Purity Springs water is used and is heated with a steam ejector under thermostatic control. The kuhlschiff room, in which the hot wort is allowed to stand for some time to cool and precipitate sediment, is cooled by a fan with an ultra violet ray sterilizing device in the duct to prevent infection of the wort by bacteria. Brine is used for wort cooling, cooling of larger cellar, hop storage, beer cooling and cooling of fermentation cellar. The brine tank is a York installation, flooded with high side float control.

Third floor: brine pumps, brine cooler and hot wort cooler, shell and tube flooded with high side float. This cooler has a back pressure valve on the suction and is also equipped with an accumulator. Hot wort cooler is a shell and tube vessel manufactured by Hasselberg. In the upper half, wort is cooled from 180 to 80 F by water supplied from a deep well pump on the 1st floor. In the future, water from a cooling tower will cool the upper half in the winter. The deep well pump will be used as a standby. In the lower half, wort is cooled from 80 to 47 F for lager and to 52 F for ale. From the cooler the wort flows by gravity to tanks in the fermentation cellar. Also on the third floor, is the grits storage. This room is cooled by a York air cooler with high side float and is kept at 60 F. It is cooled to prevent formation of weevil in the grits.

Second floor: cereal cooker, mash tub, brew kettle, lauter tub, hop storage, tap room (we saved it for last), cellars "C" and "H", and CO_2 storage tanks. The hop cellar is cooled by brine coils on the wall and is kept at 34 F. Cellar "C" has open fermenters, with brine coils in them to control attemperation. Also in this cellar is a shell and tube cooler to cool beer for storage. CO_2 storage tanks are used for carbonation. This cellar itself is cooled with brine coils in blowers suspended from the ceiling. The CO_2 from the open fermenters is evacuated by means of a small fan which exhausts to the atmosphere.

Cellar "H" contains the closed fermenters from which CO_2 gas is collected and stored for carbonation. Attemperation is accomplished by brine coils in the fermenting tanks. This room is cooled by a York air cooler. It is flooded and has a float in a column on the accumulator on the low side which, actuates a solenoid valve to admit more refrigerant as it is needed.

First floor: hop jack, Grant, transfer pumps, lager cellar, keg storage, racking room, keg washing, boiler, feed pumps, deaerating heater, air compressors, CO_2 compressors, ammonia compressors, condensers, receiver, cooling tower pumps, fuel oil pumps, fuel oil heaters, steam and electric control panels. The lager cellar is cooled by brine coils suspended from the walls and by air from an air cooler located in the racking cellar. It also contains CO_2 storage tanks, diatomaceous earth filters saturator, carbonator and pumps. Air is used for counter pressure on the storage tanks. The air cooler is a Vilter flooded cooler with low side float. Calcium is used to prevent the formation of ice.

The racking cellar is cooled with direct expansion coils suspended from the wall and ceiling. It also contains closed fermenters (which have direct expansion coils in them to control attemperation), a Vilter Baudelot cooler (used to chill water) and racking machine to fill kegs. Another lager cellar is being constructed. It will be cooled by a York air cooler flooded with low side float and will use calcium to prevent freezing. Another shell and tube vertical condenser is being added.

The boilers are Stirling bent water-tube,

Two views of Memphis members at work in their refrigeration classes. Gentleman standing in photo at right is Alvis J. Clay, Past National President.

type "H" manufactured by Babcock & Wilcox. Bunker "C" fuel oil is used. One is equipped with a steam atomizing burner and the other with a pressure atomizing burner. The feed water heater is an open Cochrane deaerating heater. Feed pumps are Warren duplex. "Nalco" feed-water treatment is used, in conjunction with continuous blow down. Air compressors are Hasselberg. Water is admitted to the suction to cool and remove dust and impurities in the air, the water is separated and dumped back in the condenser pit to conserve water. Two of the CO_2 compressors are also Hasselberg and operate the same way; the other CO_2 compressor is an Ingersoll - Rand, 2-stage compressor with inter-and after-cooler.

Ammonia compressors are one each Vilter (100 ton) synchronous motor driven, Vilter (70 ton) induction motor, Vilter (40 ton) induction motor, York (30 ton) induction motor. Condensers are shell and tube vertical. A Marley cooling tower is used. Make up water is from the city mains controlled by a solenoid valve operated by a Mercoid float.

After leaving the brewery proper, our chapter tour went across the street to the bottle house. The government cellar is located under the bottling plant. All air, steam, beer, gas is sent through a tunnel under the street from the brewery to the bottlehouse. The government cellar is cooled by Vilter air coolers and two "Freon" compressors operated by high and low pressure controls. Calcium is also used here. This completed the tour. Members and guests then adjourned to the taproom. In addition to this courtesy, Southern Brewing Co. has given us a great amount of assistance in organizing this chapter.

Chicago

BILL O'REILLY

ON NOVEMBER 22, the Chicago chapter held its meeting at the Certified Grocers Produce Building, our hosts at the request of Ralph Gotlund and Joe Lewen of Polaroid, Inc. A buffet supper was served to all members and guests in the dining room.

John Forti, program chairman, introduced Ralph Gotlund of Polaroid, Inc. He explained the plant's layout and the equipment which they installed. After his talk, members and guests went through the dry foods storage, where we watched the men filling orders. Flat trucks which are pulled by cables and are continuously in motion. They circulate past make-up racks of merchandise from which specific quantity items are drawn on order. The use of these cable trucks saves time involved in using hand or individual power trucks, and employees have less walking to do.

Visitors were taken to the banana room. Here the bananas were being processed for distribution. One locker can hold a carload of bananas. In these four lockers the bananas hang like sausages and they are water sprayed to keep them moist in storage 24 to 48 hours. In the event that it is desired to fast ripen these bananas, they are treated with ethylene gas, which is blown into the room. No banana rails are used in this installation, another unique feature.

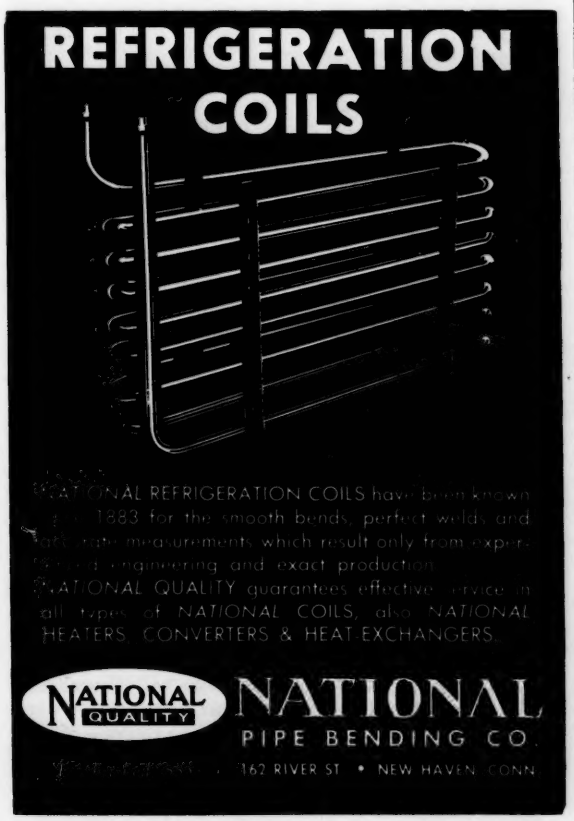
Following that, the group was taken through a minus 10 F freezer, where Niagara No-Frost blower units were used for the refrigeration in this room. Men work in these freezers picking orders, around the clock. At the time the group was there, the refrigeration units were operating on 2/3 capacity.

Next was a tour taken through a cooler and the engine room. The plant is two-stage NH_3 employing Vilter reciprocating compressors and Fuller Rotary boosters, with Watkins system of liquid recirculation. The Technical Editor of INDUSTRIAL REFRIGERATION was present and informed members that a feature article on this plant would soon appear in our Official Organ.

At the business session, Joe Farrell, the delegate to the National Convention in Los Angeles, gave a report. He said that the papers presented were very good and would be reprinted in the '56, NAPRE, OPERATING DATA BOOK. He related that 80 percent of those present at the convention went on the tour through the Lockheed Aircraft plant.

Instruments and Meters, the topic of Chapter 17, BASIC REFRIGERATION by Guy R. King, was the discussion subject of the refrigeration class on November 8. Chicago Chapter's own Art Christianson, chief engineer, Booth Cold Storage Company, served

(Continued on page 43)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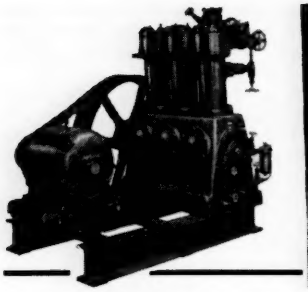

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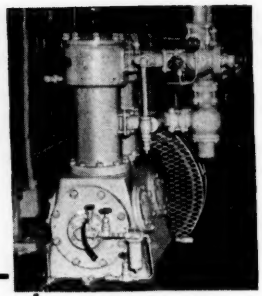

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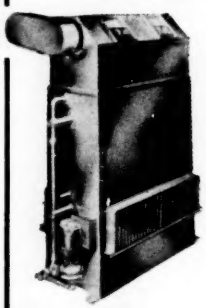

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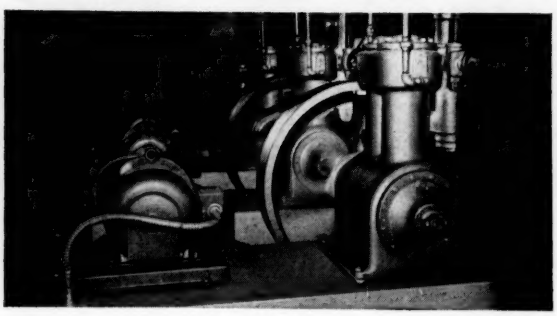


Omaha Cold Storage Merges with Consolidated Foods Corp.

IN a move to further diversify its operations, Consolidated Foods Corporation, leading canner, processor, and distributor of food products, has acquired through exchange of stock the Omaha Cold Storage Company, S. M. Kennedy, Consolidated Foods president, and H. C. Sheridan, Chairman of the Board of Omaha Cold Storage, announced November 22. The Omaha Cold Storage Company was incorporated in 1899 and sales last year approximated $36 million. The company will now operate as a wholly owned subsidiary of Consolidated Foods.

H. C. Sheridan

Omaha is engaged in the raising, purchasing and distribution of fresh and frozen poultry; the manufacture, distribution and sale of frozen chicken, turkey, tuna, beef and fruit pies; the procuring, manufacturing and distribution of butter and eggs, including fresh, frozen and dried whole eggs, egg whites and egg yolks; the cold storage warehousing of food products and the manufacture and sale of livestock feeds.

Headquarters are in Omaha where the company operates a cold storage warehouse containing about 3.5 million cubic feet of refrigerated space and freezing tunnel with a 100,000 pound daily capacity for processing frozen foods. J. L. Gagini who recently served as president of the Association of Refrigerated Warehouses and the American Warehousemens Association is vice-president of the Omaha concern.

The company also operates a feed mill at Elkorn, Nebraska, with a capacity of about 30 million pounds of mixed feed per year, and nine poultry, egg and butter processing plants in Nebraska, Iowa and Arkansas. Sales branches are located in New York, Chicago, Cleveland, Los Angeles, San Francisco, and Seattle. Poultry, butter and eggs are also distributed through brokers, and merchandise is stored in more than thirty warehouses located throughout the United States.

Acquisition of Omaha Cold Storage is a major step in diversifying further the activities of Consolidated Foods Corporation whose sales for the year ended June 30, 1955 totaled $224,786,676. Earlier this year Consolidated Foods acquired American Frigid-Dough, Inc., Chicago processor of frozen bakery products and prepared frozen foods. Last March Consolidated acquired the Chicago firm of E. A. Aaron & Bros., Inc., leading marketer of fresh and frozen fruits and vegetables.

Commenting on recent operations of Consolidated Foods Corp., Mr. Kennedy stated that for the twenty weeks ended November 19, net sales showed an increase of more than ten per cent over those in the comparable period last year and net profits were about twenty percent ahead of those during the corresponding 1954 period.

as instructor for this session. He explained the different gages, thermometers and electrical instruments. He drew diagrams on the blackboard and explained how some of the different gages operate. He related that through his experience he has found that the most effective way to install a thermometer is to sink the well only one quarter of the way into a pipe. In doing this, one can be almost positive of getting a true reading.

President Nick Downes in the absence of our program chairman, introduced E. H. Hurst, of National Aluminate Corp. He gave a talk on "Corrosion in the Refrigeration Industry". He explained what corrosion is, the many factors that have to do with corrosion, the different types of corrosion and the factors that have to be present in order for corrosion to start. He also answered many questions the members asked of him.

Los Angeles

FRED HERR

CLIFFORD P. SCOTT, plant engineer, Union Ice Co., was named president of Los Angeles Chapter, NAPRE, at the final meeting of the year held December 7 in the Terminal Club. "Scotty" as he is familiarly known, joined the NAPRE in 1945. He succeeded Elmer A. Johnson of the California Consumers Corp.

Balance of candidates submitted by a nominating committee headed by Frank Eccleston was also unanimously elected. They are: 1st vice-president, Victor A. Stubblefield, Pacific Fruit Express; 2nd vice-president, Michael Julius, California Consumers Corp.; secretary, Donald H. Byl, Union Ice Co., Treasurer, Emmet T. Quinn, Pacific Fruit Express; and sergeant-at-arms, Larry H. Benedict, The Benedict Co.

Guy R. King was chosen to head the board of directors. Serving with him as directors are J. F. Granger, Royden Ice Co., D. F. Green, Union Ice Co., and R. S. Ohling. Chairmen of the various standing committees are: Educational Guy R. King; Entertainment, Ed L. Nelson; Membership, N. P. De Santis; Attendance, A. R. Slingsby; Finance, Regis Gubser; and Employment, Mike Julius.

Applications for membership of Earle Fay and Robert P. Anhor were approved. The educational session was preceded by a showing of a golf film taken at the national convention in November by Larry Benedict. Presentation of convention reports was tabled until the January meeting to allow ample time for election of officers.

Speaker of the evening was William Dadsen, General Controls Co., Glendale, Calif. He presented a film entitled "Progress Through Controls". Dadsen gave a short prefatory talk on the part controls play in the refrigeration, air conditioning and ice manufacturing business. He cited various types of refrigeration and cooling plant controls and valves, and then supplied the commentary to the film in which the scenes illustrated various types of controls in use today.

Members were saddened to learn that associate member John T. Brausheau had passed away November 7. He had succumbed to a heart attack at the age of 47. Brausheau had been with Pacific Scientific Corp. as a field engineer for the past 17 years. The chapter honored his memory with the usual standing moment of silence.

Members-at-Large

FRANK L. CHASE

FIRST assignment or duty of second vice-president, NAPRE, is the welfare of members-at-large. Through this column and in this particular issue, it is the wish of the author (as a newly elected vice-president) to invite correspondence pertaining to our educational program, membership and any other services that NAPRE may be able to provide to this particular class of membership.

Recent correspondence from a new member in Australia may be of interest to NAPRE members. He writes as follows:

"I would like to thank NAPRE's Board of Directors for accepting my application for membership — it is very pleasing to be so honored. Membership in NAPRE has been an ambition of mine for many years but the question of nominators seemed too high a hurdle until I learned of Messrs. East and Cropper's membership.

"My employer (F. J. Walker Ltd.) has subscribed to your official organ for some considerable time and the 'Question Box' has promoted lively discussion by the engineers at times.

"As a matter of interest, F. J. Walker, Ltd. control one of the major cold stores in New South Wales, two export meat works, a fellmongery[1] and quite a number of minor freezing works with a total capacity of well over 1,000 tons of refrigeration. Our plants range from the old manually controlled direct expansion coils in the rooms and wet compression slow speed horizontal compressors with horizontal atmospheric condensers, to modern fully automatic in conjunction with liquid recirculation, medium high speed enclosed compressors, forced draft coolers and evaporative condensers.

"The foregoing is obviously not an attempt to describe our operations but to suggest that refrigeration plays a very major part in our activities and that we do try to keep abreast of the times.

"In my short lifetime refrigeration has seen a great deal of change but I feel that we have only scratched the surface, and that much more than we know is still to be learned."

Concerning the many field trips offered by the Los Angeles Chapter, during the recent convention, the following correspondence has been received from F. T. "Mike" O'hara, chief plant engineer at Lockheed Aircraft Corp., Burbank. "It was very gratifying to me to see so many interested in visiting our plant, Lockheed Aircraft Corp., where I have been employed the past fifteen years. Hope all who were our guests enjoyed the tour. I myself was the guest of the California Consumers Corp., a visit to their Pasadena plant with the genial Elmer Johnson as our host and guide."

[1]Fellmongery — an establishment or works for separating sheepskin from wool or pelts.

NAPRE

Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Address questions and answers to Prof. Harold P. Hayes, Dean of Engineering, State Polytechnic College, San Luis Obispo, Calif.

Wants Practical Explanation On New "Freon-12" Findings

QUESTION NO. 1084: Since early summer I have heard some discussion and seen brief news accounts regarding new thermodynamic properties of "Freon 12". Last week I read a report on the subject. I am unable, however, to determine what effect, if any, these new properties will have on my job as maintenance engineer. What will it mean to my employer in operating cost?

We operate about twenty "Freon-12" plants ranging from fifty to two hundred tons. The refrigeration is used for humidity and temperature control of industrial equipment as well as comfort cooling for personnel.—N.M.D., Chicago.

ANSWER: The new determination of the properties of "Freon-12" will have no effect on your job as an operating engineer nor to your employer in operating costs. The new data gives negligible difference from the old, in evaporator and condenser pressures when related to corresponding temperatures.

The greatest error in the old tables was found to be the refrigerating effect per pound of refrigerant. This has no effect on the rating of compressors since these ratings are based upon tests. It is of particular interest to design engineers since correction of former errors in values makes possible a better forecast of performance characteristics of "Freon-12" refrigeration systems.—N.S., San Luis Obispo.

Proper Collection Point And Purger Instruction Sought

QUESTION NO. 1085: The problem of keeping an Armstrong Purger working properly was brought up with the report that the purger would fill with liquid ammonia soon, and stop functioning. The question was, "How can I fix it?" After some questioning several members reached the conclusion that there was nothing ailing the purger, but that it was receiving such a supply of pure ammonia vapor and so little noncondensable gas, that it automatically quit operating for lack of noncondensables to purge out. It was suggested that the purging be attempted from the top

of the condensers instead of the top of the receiver, since air apparently was not collecting in the receiver under the present operating conditions.

ANSWER: Purging is commonly done from either the condenser or receiver. Best results are obtained when the purger is located where the non-condensible gases in the system collect. On a coil type condenser, such as an evaporative condenser, the refrigerant gas velocity is high and the non-condensible gases are generally pushed into the receiver.

However, when the gas velocity is low, such as in an ammonia condenser using a number of refrigerant passes in parallel, the non-condensible gases may be trapped in the condenser. Experience has also shown that on long horizontal condensers with the gas inlet in the center of the shell, the gases will not be pushed into the receiver.

In your particular case, it might be well to try purging from the condenser instead of the receiver.—H. P. Hayes.

Wants Drying Schedule for Cement-Insulation Mixtures

QUESTION NO. 1086: How long a period of drying time is required for a 10-inch layer of vermiculite (Zonolite) before refrigeration can safely be applied to the walls of a newly constructed ice-storage vault? It was reported that one such wall had cracked all the way down one side in earlier construction after the moisture had a chance to freeze, but the interval between pouring the Zonolite-cement mix, and application of refrigeration was not known. The Zonolite was poured between an 8" brick wall with vapor-seal inside, and a 4 inch Haydite wall without any coating on the inside.

ANSWER: Vermiculite is hygroscopic and takes a long time to dry out. The time of drying will depend on the thickness of the layer of vermiculite, its temperature, and the water vapor pressure in the room air. Unless the room is kept well ventilated during the drying process, a 10-inch layer might possibly take months to dry.—N.S., San Luis Obispo.

Descaling Lines With Acid

QUESTION NO. 1087: What are recommended practices for descaling compressor-jacket cooling water lines, by the inhibited acid method? What precautions should be made for foaming? Is it hydrogen gas developed from this cleaning process? If so, what precautions should be taken against fire, explosion? What is the recommended use of tri-sodium phosphate or Zeolite treated water to reduce scaling?

ANSWER: Hydrochloric acid may be used with sodium dichromate as the inhibitor. Foaming will occur and cannot be prevented. The gas produced is carbon-dioxide and is not dangerous.

The operating engineer is usually poorly equipped to perform this operation and hence he will find it to be a messy job. He will probably find it better to call in a water chemist who is better equipped to perform the operation.

Sodium hexmetaphosphate (Calgon) and Zeolite treated water will reduce the scaling and may in time remove it.—N.S., San Luis Obispo.

Anti-Freezing Methods For Winterizing Water Coils

QUESTION NO. 1088: In preparation for winter, we have a job of draining and protecting about one hundred large chilled water coils. These coils are located in central ventilating systems. Our winters are very cold and these coils, at times are subject to freezing temperatures.

Every spring when we refill we usually find a number of leaks caused by pockets of water freezing and splitting the coil. I would like some suggestions on protecting these coils. —N.M.D., Chicago.

ANSWER: If the connections are suitable it may be advisable to flush the coils with an anti-freeze solution of di-ethylene-glycol. This material is not corrosive and will do no damage to the coil should some of it remain "pocketed".—N.S., San Luis Obispo.

New Questions

Casting Information Wanted

QUESTION NO. 1089: In the November INDUSTRIAL REFRIGERATION, I notice a reference to investment casting and mercury castings. I am under the impression that a mercury casting is a type of investment casting. Would anyone care to explain how an investment casting differs from a molded sand casting?—F.K., Chicago.

Separating NH_3 from Oil

QUESTION NO. 1090: We have discussed many times the possibility of removing ammonia from crankcase oil and re-using the oil. Have any of your readers had experience along these lines? Is it possible and if so, how can I do it?—L.C.C., Green Bay, Wisc.

Air Conditioning Indirectly Using Sweet Water Medium

QUESTION NO. 1091: We are interested in doing some indirect air conditioning using sweet water. Can you give us the name of some engineer who has had experience in this line?—J.E., Tulia, Texas.

Seeks Standard Data For Compressor Test Comparisons

QUESTION NO. 1092: I have heard a number of sales engineers say that their compressors are better than their competitors of equal rating because they are more conservative in their testing. Aren't all compressors tested under standard code conditions? If not, is there any way I can tell who is conservative and who isn't?—C.E.C., Chicago.

Wants Insulation Envelope Around Building Exteriors

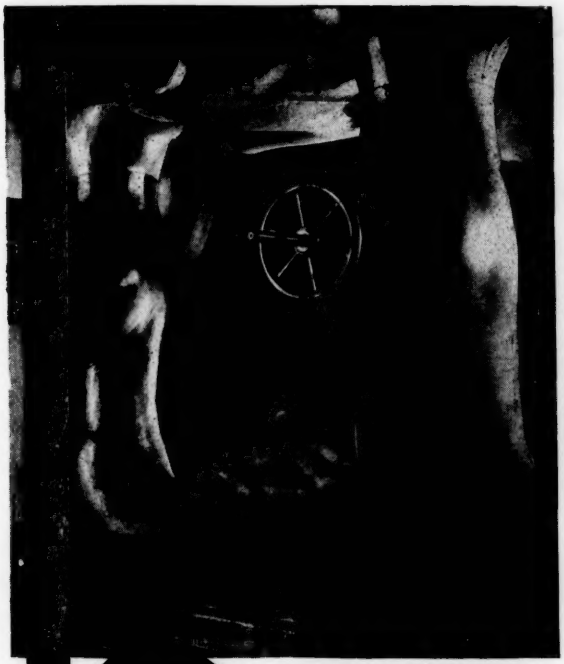
QUESTION NO. 1093: I have often wondered why insulation is put on the inside instead of on the outside of cold storage rooms. Wouldn't it be more desirable to stop the heat gain at the outer surface rather than to let so much heat into large masses of concrete and then trying to stop it at the inner surface? Also, if the large mass of concrete were kept cold, wouldn't it provide a good "flywheel effect" of stored refrigeration in case of a brief equipment failure?—A.C., Chicago.

National Ice and Cold Storage Shifts Officers

AT THE last meeting of the Board of Directors of the National Ice & Cold Storage Co., San Francisco, Calif. F.O. Cooke tendered his resignation as president, which was accepted effective January 1, 1956, and he was thereupon elected to the office of Chairman of the Board of Directors. Mr. Cooke is a longe-time resident of San Francisco, although for a period of time he resided at Woodside. He has held the office of president since first being employed by the company some twenty two years ago.

M. W. Young, the present vice-president and general manager, was elected to the office of president and general manager effective January 1, 1956. Mr. Young is at present a resident of San Rafael, although during some 38 years of employment with the company, during which time he was employed at various locations of the company throughout the state, he was naturally called upon to move his residence with each change of employment. He was elected vice-president and general manager in 1946 and a director in 1947. Prior to that time he had been the manager of the Sacramento operations of the Company since 1937.

F. C. Coupe was elected vice-president in addition to his offices of secretary and treasurer, effective January 1, 1956. Mr. Coupe is a long-time resident of Alameda and has been employed by the company in San Francisco for some 36 years. He was elected secretary and Treasurer in 1946 and a director of the Company in 1953.



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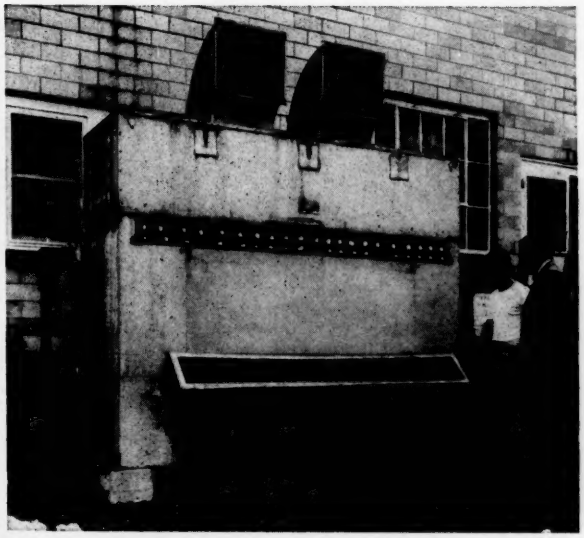

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FRICK evaporative condensers with super-saving water-air control attachments automatically cut over-all plant operating costs.

If you want to save water, save power, and save labor; if you must avoid freeze-ups in winter, and bothersome changes in head pressure the year 'round; if your refrigerating plant runs at times without an engineer—then you need the Frick-Mollenberg automatic condenser super-saving control.

This patented system shuts off the water, and later the fan, when not required. It utilizes water from the compressor jackets. It handles overloads, or pump failure, with fresh water. Water lines are drained in cold weather. Flooding or starving of coolers and coils from fluctuating feed pressures are stopped. These and other advantages are performed automatically, saving the time and labor.

Only Frick Company is licensed to furnish these valuable features. Before buying any evaporative condenser, ask how this super-saving control can reduce operating expense in YOUR plant. The Waynesboro, Penna. Office or a nearby Frick Branch Office will give you detailed information without obligation. Write, wire or phone

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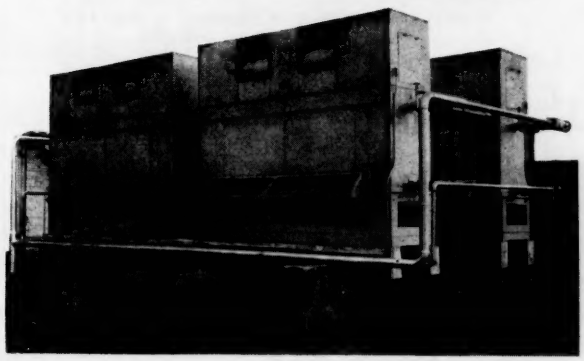
FRICK CO.

WAYNESBORO, PENNA. U.S.A.



These condensers are among many in Buffalo equipped with Frick-Mollenberg super-saving control.

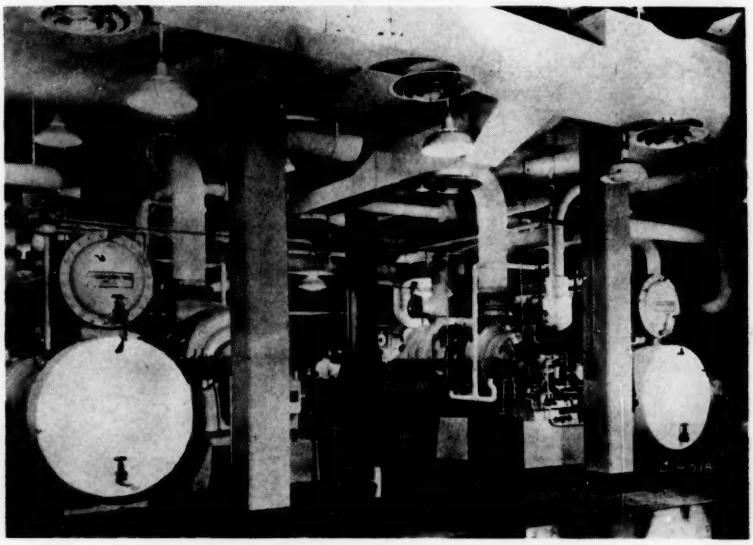
Morton Packing Acquired By Continental Baking

THE CONTINENTAL Baking Co. has acquired all the business and property of Morton Packing Co. of Louisville, Ky., one of the country's large producers of frozen meat pies and frozen fruit pies. R. Newton Laughlin, president of Continental, made the announcement at a meeting at which official transfer of title took place.

"This is another step in Continental's continuing program of diversification", Mr. Laughlin said. He also announced the formation of a wholly-owned subsidiary of Continental Baking Co. under the name of Morton Frozen Foods, Inc., which will own the properties and operate the business under the same management that guided the Morton Packing Company.

George E. Egger, president of the former Morton Packing Co., will serve as president and chief executive officer of the new subsidiary. The manufacturing plants of Morton Frozen Foods, Inc., are located at Crozet, Va., Nashville, Tenn., and Webster City, Iowa.

New Centrifugal Refrigeration Compressors Installed



Two 300-ton Worthington Centrifugal Refrigeration Compressors providing complete air conditioning have been installed in the general headquarters building of the world's largest handler of natural gas, United Gas Corporation, of Shreveport, La. The building is a seven story structure with a new ten story wing. Compressors are driven by 302 hp Worthington steam turbines (4200 rpm) complete with steam condensers and auxiliaries.

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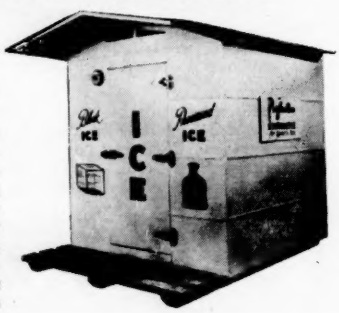
Lends itself to the most modern setting. 12 Block capacity. Aluminum roof, 2 ft. canopy on front. Heavy insulation, ½ H.P., air cooled compressor. Automatic defrost. Single phase 110 volt.



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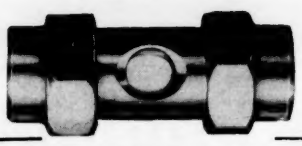

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All feature:

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- **Ruggedly constructed of cadmium plated steel.**
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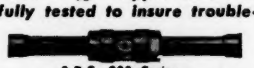
Same design in the 5000 Series with extended tube ends for ¾" thru 1-⅝" copper tube sizes. All Liquid Eye Indicators carefully tested to insure trouble-free performance.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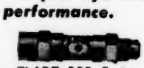
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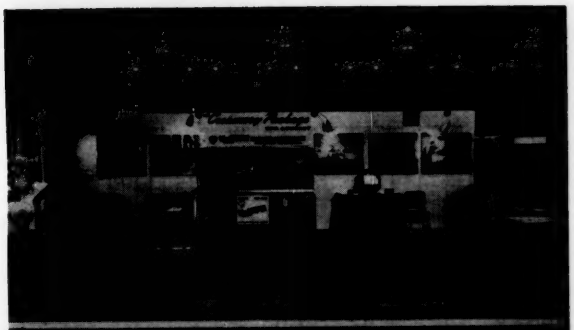
9th Air Conditioning and Refrigeration Exposition

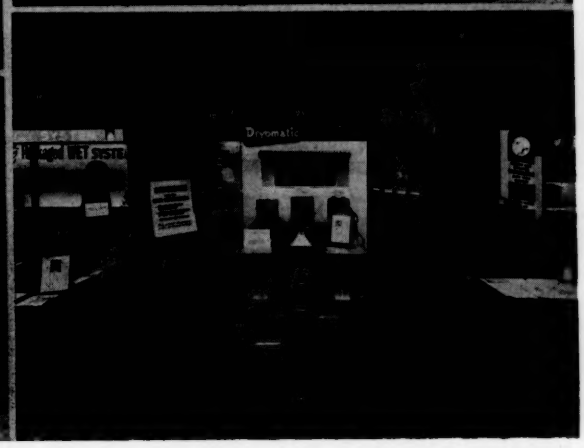
THE 9th Refrigeration and Air Conditioning Exposition held in Atlantic City November 28 through December 1, drew a record attendance of 13,376 industry members. This was 10 percent higher than the previous all time record set at Cleveland in 1953.

The large Atlantic City exhibition hall which included displays from England and Mexico was crowded with 252 exhibitors.

Five affiliated industry groups held their annual conventions simultaneously with the exposition. They were the Refrigeration Service Engineers Society, Refrigeration and Air Conditioning Contractors Association, National Commercial Refrigerator Sales Association, Air Conditioning and Refrigeration Wholesalers and the American Society of Refrigerating Engineers.

Typical exhibits at the 9th Refrigeration and Air Conditioning Exposition, Atlantic City.





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Training Conference For Warehousemen

AN ADVANCED training conference for warehouse personnel will be held by the Refrigeration Research Foundation and the National Association of Refrigerated Warehouses January 22-26 at the Memorial Union Building, Purdue University, Lafayette, Ind.

The subjects to be covered include: sales of warehouse services, personnel relations, public relations, mechanical handling, freezing of foods, warehouse management and operation, control of stored product environment, packaging for warehouseability, commodities in storage (by panel discussion), labor relations, office procedures and practice, engine room operation, and radiated foods in relation to refrigerated warehousing.

The commodities in storage panel will have specialists to answer questions in regard to meats, dairy and poultry products, fruits and vegetables, candies, nuts, fisheries products and miscellaneous storage items.

Sessions

Sessions will start officially on Monday, January 23. A Get Acquainted Function will be held on Sunday evening, January 22.

Lectures will occupy the morning hours. In the afternoon, the registrants will form into small discussion groups to enable them to thoroughly digest all of the information presented and to encourage a free exchange of ideas.

Discussion leaders and instructors will include well known experts from within and outside of the refrigerated warehouse industry.

Reservations for the Conference should be directed to the National Association of Refrigerated Warehouses, 1210 Tower Building, Washington 5.

Those who have attended previous conferences, as well as those who are new to the warehouse business, are promised that they will gain much in practical information worth dollars to their business by joining in this down-to-earth practical industrial conference.

Joint Ice Conventions Ohio Indiana Michigan

THE Ohio, Indiana, and Michigan Associations of Ice Industries will hold a joint convention January 30 and 31 and February 1, 1956 at the Detroit Leland Hotel, Detroit, Mich. Final arrangements were made at a meeting of convention committees of the three Associations, December 15. Last year Ohio and Indiana held a similar joint convention at Dayton.

This year the combination of three strong middle west associations will make possible an outstanding program, which will combine both talented speakers and open forum discussions that will be bound to pay off in future profits for those ice men who attend. In addition, a top quality entertainment program is in the making, which will include the usual get-together party Sunday evening, January 29.

Exhibit spaces will be located in a prominent area in the convention hall, where many supply and material concerns will have displays of their products.

F. D. Newell, Jr. (right) President, National Association of Refrigerated Warehouses, receives the National Safety Council's Association Award on behalf of the refrigerated warehouse industry from David L. Arm, Manager, Industrial Department, NSC. NARW received the award at the recent National Safety Congress in recognition of its successful industry-wide safety program.

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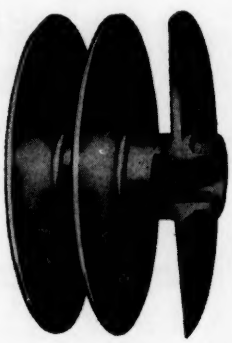
DETROIT ICE MACHINE COMPANY

2615 Twelfth St., Detroit 16, Mich.



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Predicts Big Expansion of Air Conditioning

THE American air-conditioning industry will expand into a six billion dollar business by 1965, it was predicted by John E. Haines, president of the American Society of Heating and Air-conditioning Engineers.

Vice-president of the Minneapolis-Honeywell Regulator Co. and author of a textbook on controls, Mr. Haines discussed "The Next Ten Years" at a joint dinner meeting of air-conditioning engineers and the American Society of Refrigerating Engineers held at the University Club, Buffalo, N.Y. Noting that central air-conditioning in homes alone will reach two million units by 1965, he said the industry has a responsibility to the public.

Fire Damages Ice Plant

A FIRE caused an estimated $10,000 damage to the Marin County Ice Co. plant, San Rafael, Wash., sending ammonia fumes over a part of San Rafael. Firemen donned gas masks to fight the blaze and brought it under control in three hours.

COMING CONVENTIONS

MISSOURI VALLEY ICE MANUFACTURERS ASSN.
January 9-10, 1956
President Hotel, Kansas City, Mo.
V. A. ESPHORST, Secy-Treas.

TRRF — NARW ADVANCED TRAINING CONFERENCE
January 22-23, 1956
Purdue University, Lafayette, Ind.
H. C. Diehl, Director TRRF
Wm. Dalton, Exec. Vice-Pres. NARW

SOUTH CAROLINA ICE MANUFACTURERS ASSN.
January 23-24, 1956
Wade Hampron Hotel, Columbia, S. C.
MARGARET I. KINDER, Secretary

NATIONAL ASSOCIATION FROZEN FOOD PACKERS
January 29-February 2, 1956
Waldorf-Astoria Hotel, New York, N. Y.
LAWRENCE S. MARTIN, Secretary-Manager

OHIO-INDIANA-MICHIGAN JOINT CONVENTION
January 30-31, February 1, 1956
Detroit Leland Hotel, Detroit, Mich.

GEORGIA ICE MANUFACTURERS ASSOCIATION
February 21-22, 1956
Dinkler Plaza Hotel, Atlanta, Ga.
MILDRED NICHOLS, Secretary

SOUTHERN ICE EXCHANGE
February 21-22, 1956
Dinkler Plaza Hotel, Atlanta, Ga.

NORTH CAROLINA ICE ASSOCIATION
March 12-13, 1956
Sir Walter Hotel, Raleigh, N. C.
LEWIS H. POWELL, Secretary-Treasurer

AMERICAN WAREHOUSEMEN'S ASSOCIATION
April 9-13, 1956
Hotel Statler, Los Angeles, Calif.
Wm. Dalton, Secretary

NATIONAL ASSOCIATION REFRIGERATED WAREHOUSES
April 9-13, 1956
Hotel Statler, Los Angeles, Calif.
Wm. Dalton, Executive Vice President

Packaging by Volume Content Subject of Swedish Research

PACKAGING based on volume content instead of weight in the foodstuffs trade may be the outcome of an investigation at present being carried on by the Transport Research Committee of the Swedish Academy of Engineering Sciences. This and other related research work is dealt with in the Committee's annual report for 1954-55 just published.

A special sub-committee on the handling of consumer goods is at present engaged in a comprehensive study of the various problems of the food trade. It is of great importance that transport packings are based on a suitable module system which permits of building up unit loads for loading pallets, it is emphasized in the report. Such a system will increase the possibilities of distributing unopened packages from the manufacturer via the wholesale dealer to the retail trade. Volume packaging seems especially suitable for this purpose.

The question of a uniform design for packing of deep-frozen goods is being discussed by the sub-committee for the standardization of packaging with the Academy's Deep-freeze Bureau and representatives of the manufacturers of refrigerators, freeze-boxes and deep-frozen foods. When an agreement has been reached on a standard for such packaging, a special standard will be worked out for the various kinds of refrigerator containers.

The sub-committee on handling of materials reports that it will shortly present recommendations for the design of trailers and semi-trailers. A proposal for the standardization of the dimensions of the loading platform of trailers has already been worked out. The same committee is engaged in establishing uniform bases for calculating the operational costs for different means of transport, in order to facilitate a comparison within and between enterprises using the same kind of vehicles. Standard solutions for the equipment of storage localities are also being prepared.

More Peaches Less Corn Frozen This Year

PRELIMINARY pack statistics compiled by the National Association of Frozen Food Packers on two separate crops showed varying results. The frozen peach pack, even with the southern crop virtually wiped out, was the largest since 1946. On the other hand, the pack of frozen cut corn was lower than it has been since 1952.

The total pack for frozen peaches was 46.9 million pounds, the report shows. This is higher by 29 percent than 1954. Of the total pack, 34 mililons pounds was processed in the west, a gain of 55 percent over last year's 22 million pound total. Both the midwestern pack (5.6 million pounds) and the northeastern pack (7.2 million) were higher than last year. The south, which last year packed 3.9 million pounds, lost practically all of its crop because of freezing weather early this year.

As usual, about 80 percent of the frozen peach pack went into the large institutional and industrial containers. Retail sizes accounted for the other 20 percent.

For frozen cut corn, the year's complete pack totaled 66 million pounds, according to the preliminary report. This was 15 percent under last year's 78.2 million pounds, and all of the drop can be accounted for in the west where the pack went from 42 million pounds in 1954 to 26 million this year. Moderate gains were shown in the midwest, east, and south.

However, very little of the loss in frozen cut corn occurred in retail sizes. In the familiar 10-ounce size the total pack was 30.5 million pounds this year.

New Power

(Continued from page 15)

motor, because of high inrush current. It is possible that across-the-line starting could be applied to 480 volts, but in order to make a fair comparison, it will be assumed that reduced voltage starting is applied here as well. A magnetic transformer type starter for the 208-volt motor would cost the contractor approximately $2.200.00, while for the 480-volt motor it would cost $1,190.00.

Switchgear More Costly

Naturally all is not on the credit side of the ledger. Panelboards for use on the 480-volt system cost approximatey 250 percent more than panels designed for the lower voltage. But, more than twice the fixtures may be put on each branch circuit. Main switchgear, particularly if fusible, is much more expensive. The dry transformers are a definite addition to cost.

On the credit side we have the motors, starting gear, conductor and raceway; raceway size naturally being dependent on conductor size. The savings on conductor are all credit since, excepting for fixture wire, the standard rating is 600 volt.

On the basis of the preceding, the case for the higher voltage system in office buildings is strong indeed. It is believed that the future holds increased prominence and consistently favorable mention for this system.

Ice Convention

(Continued from page 22)

retary and Treasurer, Mrs. Edna Vaughan, Secretary of the Delta States Ice Association.

Retiring President Andres Given Token of Appreciation

A beautiful wrist watch was presented to retiring NAII President Paul H. Andres of Oklahoma City, as a token of his valued and distinguished services to the Association during his term as president. The presentation was made by Immediate Past President William J. Ayers, president of the Standard Ice Company of Memphis, Tennessee.

Regional Conferences

The Board of Directors decided to continue the regional conferences program which has been under way for the last two years. The plan calls for continuation of this Association activity along the same pattern as last year.

Atlanta in 1956

It was officially announced at the convention that the 1956 National Convention will be held in the Southeast at the Biltmore Hotel, Atlanta, Georgia.

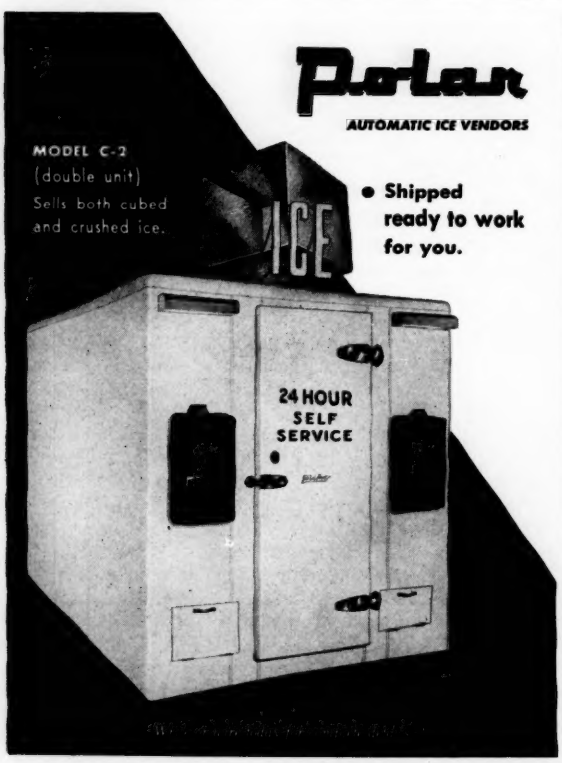
Letters to The Editor

(Continued from page 16)

referring to the bottom-feed evaporator. The statements in "Liquid Ammonia Recirculation" pointing out the elimination of the boiling-point elevation in a recirculation system are limited to down-feed systems.

The brewery systems with the surge drums on the roof fall into a slightly different category than the evaporator with individual float valves. The static head on an evaporator in the brewery system is not necessarily the amount indicated by the elevation of the surge drum above the evaporator, since the balancing valve reduces the pressure of the ammonia before it enters the evaporator.

W. F. Stoecker
University of Illinois
Urbana, Ill.



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MONTGOMERY • MINNESOTA

OHIO SPECIAL ICE CANS

WELDED – RIVETED ICE CAN GRIDS

Industrial Trucks and Trailers

THE OHIO GALVANIZING & MFG. CO.
NILES OHIO

Single Unit Refrigeration For Retail Outlets

INSTALLATION of one major motor and compressor to replace the 25-30 currently used in retail outlets may be recommended during the January convention of the National Association of Frozen Food Packers by its special cabinet task force group.

Hamilton Stone, national sales manager of Minute Maid and committee chairman, told the Central States Frozen Food Association in a meeting at Chicago recently that studies reveal potential savings of 30 percent in installation costs and another 30 percent in maintenance costs. The package would include a "standby" motor and compressor for emergency purposes.

Surveying all segments of the industry in an effort to break the freezer bottleneck at the retail level, Mr. Stone reported that the program includes the study of "an entirely new concept in cabinets" and "proper utilization of existing equipment."

Seeking comments from members of the Association, Mr. Stone was told that varying temperatures required in retail outlets might make the plan impractical. Instead of one motor and compressor, it was suggested that three or four pieces of equipment would be needed.

Mr. Stone's progress report on the committee's efforts offered hopes that new models of multi-tier cabinets and an increase in shelving space of current boxes might provide a partial solution.

Sam Vogel, president of the National Frozen Food Distributors Association suggested the use of dairy cabinets for frozen foods.

Dry Milk is Sold For Domestic Feed Use

THE U. S. Department of Agriculture has announced sales of 344,410 pounds of Commodity Credit Corporation-owned nonfat dry milk for domestic feed use. The dry milk is from stocks found to be unsuitable for human food use. Therefore, it is being sold on a bid basis for feed use.

Of the 344,410 pounds sold to date, Mutual Products Company, Minneapolis, Minn., has purchased 142,000 pounds at 10.15 cents per pound in store and 52,650 pounds at 10.25 cents per pound in store, and the Consolidated Products Company, Danville, Ill., 149,760 pounds at 9.15 cents in store.

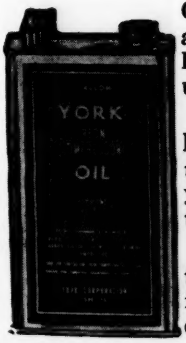
About two million pounds of the quantity found to be unsuitable for food use because of storage damage, and offered on sales schedule No. 4 of Announcement DA-110, remain to be sold. The bulk of this quantity is in store in Minnesota and Wisconsin, with small quantities in Missouri and Virginia.

Automatic Apple Box Filler

AN AUTOMATIC filler that virtually eliminates labor costs of "loose filling" wood or fiberboard boxes in apple plants has resulted from contract research in which the Washington Apple Commission has been the contractor, and Transportation & Facilities Branch of Agriculture Marketing Service of USDA, has supervised the contract. The equipment mechanizes the apple filling operation. It fills three to four boxes a minute or up to 1600 a day. It handles fruit gently, with less bruising than most manual operations. It cuts cost from four to five cents per box down to a fraction of a cent per box. Boxes and fruit move automatically. As a box fills, it swings slowly downward, and filling stops when weight is reached. A public-service patent has been applied for. Information can be obtained from Agricultural Marketing Service on the Washington State Apple Commission, Yakima, Washington.—TRRF Bulletin

YORK REFRIGERATION OILS:

sta-bility



Compressors are running *hotter* and faster than ever before, and heat is the big enemy of unstable oils.

Engineers say this trend to higher operating speeds *and* temperatures started some years ago, and it is expected to continue.

Your equipment needs the protection of oil you know is *stable*—and York Oils definitely are!

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News of People

Rogers Retires—Succeeded By Wm. B. McGowan

WILLIAM B. McGOWAN, 7231 South Princeton, a native of Chicago's south side, is the new head of storage operations for Swift & Company, it was announced. McGowan succeeds Sidney C. Rodgers who retires after 46 years of service with the national food processing company. McGowan has been with Swift since 1933.

Sidney C. Rogers

Wm. B. McGowan

He advanced from his first position of moving tierces at the G. H. Hammond Warehouse company, a Swift associate firm, to head of the Hammond Warehouse department by 1946. He was transferred to Swift & Company's Warehouse department in 1948 and in 1950 he went into the office of vice-president G. J. Stewart for one year. He was assistant to Rogers at the time of his present appointment. Mr. McGowan is a member of the National Association of Practical Refrigerating Engineers and the American Warehousemen's Association.

JOHN M. FOX, President of Minute Maid-Snow Crop Frozen Foods, was elected chairman of the finance committee of the Grocery Manufacturers of America, Inc., at the organization's 47th annual meeting in New York City November 18. Fox also served on the GMA executive panel during sessions, discussing with several other presidents of leading food companies the subject "The Challenge of Prosperity—What We Need To Do."

C. C. Berkley, vice-president and general manager of Merchants Refrigerating Company of California has been appointed to the Vice Presidency of Merchants Refrigerating Company (parent firm). Mr. Berkley will continue as vice-president of the California firm also, A. N. Otis, President announces.

DANIEL C. McCOY announces retirement October 31, 1955 from Frigidaire Division, General Motors Corporation after 30 years of service. He will be available thereafter for consultation in the following fields: Applications of Refrigeration to Commercial and Industrial Uses, Applications of Air Conditioning, Food Technology—Frozen Foods, Handling, Transportation and Storage of Perishables; Electronics—Electronic Heating and Communications; Sales Technique and Sales Management. Mr. McCoy was educated at Cornell University, specializing in chemistry and formerly was with the U.S. Army Signal Corps and Air Service.

Daniel C. McCoy

ANDREW T. BOGGS III was named to the post of Technical Secretary of the American Society of Refrigerating Engineers as of October 1. He succeeds Gurdon R. Munger, who is now associated with the Owens-Corning Fiberglas Co. Mr. Boggs came to ASRE from the Edison Electric Institute where he had spent a total of ten years. Since the inception of the Joint AEIC-EEI Heat Pump Committee in 1947 he has served as secretary while also working directly under the assistant managing director.

CHARLES E. EELS has retired from his position as vice-president of the Manhattan Refrigerating-Union Terminal Firms effective December 31. Mr. Eels over a long period of years has rendered valuable service to the public refrigerated warehousing industry.

GEORGE MENTLY, former general sales manager for Birds Eye and president of The National Association of Frozen Food Packers, has been named Marketing Manager of the Birds Eye Division of Frozen Foods, Ralph Garside, Eastern divisional manager for the company will take over Mr. Mentley's former duties.

C. B. HART, Tacoma, Wash., was elected president of the Tacoma Ice Co., recently, replacing E. S. McCord who resigned. The board of directors, meeting in Seattle, also retained Mr. Hart as general manager.

DON ROSE in previous years, except for a short period, connected with F. A. Dickinson & Company, Des Moines, Iowa, is now in complete charge of the Sturdy Built line of ice vending machines and stations for the Dickinson Company. Mr. Rose has been connected with the ice industry, off and on, for several years.

DEATHS

Charles L. Spoonhour

THE DEATH of Charles L. Spoonhour, manager of the Lewis Refrigerating Supply Company, Seattle, Wash., occurred of a heart attack November 15. He was associated with the Frick Company, Waynesboro, Pa., for 22 years until 1946 during which time he served as assistant to the chief engineer. In 1946 he moved to Seattle where he became manager of the Lewis Refrigerating Supply Company, a contracting firm serving the Pacific Northwest.

Mr. Spoonhour has been a member of the American Society of Refrigerating Engineers since 1936, and was a contributor to the ASRE Data Book. He was a registered professional engineer in the State of Washington, a member of the Washington Society of Professional Engineers, a member of the National Society of Professional Engineers and a member of the Society of American Military Engineers.

Stephen J. Hoff

THE Death of Stephen J. Hoff, president of the Random Ice & Coal Company, Milwaukee, Wis. occurred December 14 at Columbia Hospital. He was 74.

A native of Milwaukee, Mr. Hoff with his father, founded the Random Ice & Coal Company in 1902. He had been president since his father's death in 1934. He also was an organizer and vice-president of the National Ice & Coal Company, Milwaukee. He was a member of the Milwaukee Association of Commerce, Knights of Columbus and Holy Name Society of SS Peter and Paul catholic church.

He is survived by three brothers: Paul, Otto and John, who are with the Random Ice & Coal Company, and three sisters, all of Milwaukee.

George R. Goheen

THE death of George R. Goheen, superintendent of the Great Lakes Terminal Warehouse, Toledo, Ohio occurred at his home in Toledo, December 6. He was 59. Mr. Goheen was the first and only superintendent of the Great Lakes Terminal, which was established in 1928. Prior to going to Toledo, he was with the Federal Cold Storage in Columbus.

A veteran of World War I, he was a past commander of South Side Post of the American Legion and former head of the Legion's 40 & 8. He was born in Chillicothe, Ohio and lived in Columbus for ten years before going to Toledo.

Parks C. Warren

THE DEATH of Parks C. Warren, retired ice manufacturer, Statesville, N.C. occurred November 21. He had been in declining health for four years but death came unexpectedly. He was 74. Mr. Warren manufactured the first ice made in Statesville near the turn of the century.

PHILLIP J. COX, refrigeration engineer for the Beatrice Creamery Co., Des Moines, Iowa, until retired 13 years ago, died November 4.

CHRISTIAN STEENSTRUP who invented the hermetically sealed refrigeration unit and many other refrigeration devices died November 15. He had retired in 1945 as a consultant on refrigeration for General Electric which had hired him in 1901 as a toolmaker. He was a native of Denmark and was once an immigrant ditch digger. He was 81.

ARTHUR MARSHALL, Longview, Tex., formerly ice plant manager in Dallas for the Southern Ice & Utilities Co., died November 24. He was 84.

MANUFACTURERS' NEWS

Trends in Industry Increase Use of Insulation

THE Thermal Insulation Society meeting at Charleston, W. Va. November 22 was told that trends in industry towards the use of greater extremes in temperature make it necessary to re-evaluate insulation theories. The speaker was Charles Q. Livingston, technical advisor to the Armstrong Cork Company's insulation division.

Mr. Livingston pointed out that in addition to high and low temperatures that have never been used before in industry, there are also severe exposure problems in industry because of the increasing use of equipment, lines and vessels outdoors.

To meet these increasing demands for effective insulation he said that research facilities and new testing methods have been turned towards the solution of this problem. He said that future results are expected to improve both the performance of insulation materials as well as the design.

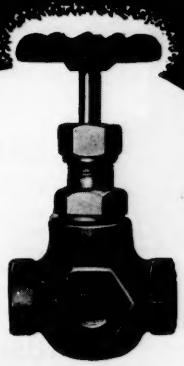
Among the new concepts over the horizon in industrial insulation, Mr. Livingston cited entirely new forms of pipe coverings and weather protecting films.

Trane Signs Sales Pact

THE TRANE CO., LaCrosse, Wis. manufacturer of air conditioning, heating, reports it has signed a contract to furnish Gregg Co., Ltd., Belgian builder of railroad cars for service in foreign countries, with railroad air conditioning and refrigeration equipment. Products which Trane will furnish Gregg under this new agreement include compressors, condenser and evaporator coils and condenser and evaporator fans.

Efficient Designs For Long Life And Low Maintenance

SHANK AMMONIA VALVES



Shank Valves have earned a reputation for high quality, long life and dependable products.

Built of highest grade materials with close tolerances —will stand most rigid inspections.

Largest line of Ammonia All-Steel Bar Stock Valves in the industry. Completely Cadmium plated.

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THE Pioneer and Leader FOR 27 YEARS

Standard of comparison for the entire industry!

Imitated but *never equalled.* Buying from a reputable national firm is your assurance of parts availability and service for years to come. *Buy* S & S! . . . the industry's finest ice vending equipment! Our specialty, not our sideline.

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New Expansion of Foamglas

THE Pittsburgh Corning Corporation, will expand production of Foamglas cellular glass insulation at its Port Allegany, Pa. plant by 50 percent says an announcement by J. P. Staples, executive vice-president. Additional melting and processing equipment, at an estimated cost of $1,250,000, will be installed in existing buildings. This will include a much larger continous melting furnace, two roller hearth furnaces, two lehrs, ball mills, trimming machines, dust collectors, conveyors, bins and similar accessories. This expansion is in addition to a similar 50 percent increase in production at the company's Sedalia, Missouri plant announced earlier this year. This program, costing $1,500,000, is now nearing completion.

CATALOGS AND BULLETINS

Air Conditioning Bulletin

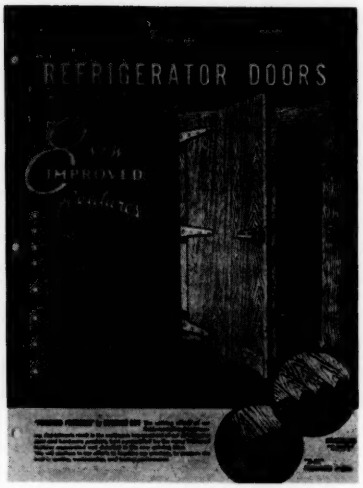
A BULLETIN on air conditioning refrigeration (No. 80-D) has been distributed by The Frick Company. Consisting of 32 pages and cover it provides a wealth of information, including storage temperatures for various foods, principles of refrigeration, air conditioning, low pressure refrigerating units, low temperature booster systems, refrigeration tables and other informative features.

Insulation Case Studies

A SET of five insulation case study reports applicable to the dairy food industry is available from the Pittsburgh Corning Corporation, Pittsburgh, Pa. The reports, bound in a neat spiral binder, illustrate how actual insulation problems in the industry were solved. Text and photographs describe the insulation thicknesses, installation procedures and results. The companies covered include both large and small ice cream plants as well as dairy product and milk plants.

Freezer-Cooler Door Catalog

A NEW 20-page refrigerator door catalog has recently been released by the Butcher Boy Refrigerator Door Co., Harvard, Illinois and is available by writing the company.



Front Cover of New Butcher Boy Catalog

The catalog printed in three colors describes in detail the new improved features included in the complete line of cooler-freezer doors manufactured by the company, such as X-type steel diagonal bracing, safety releases, adjustable spring hinges, super seal fasteners, super cam vestibule door hardware, and automatic electric defrosters. Included also are detailed specifications and clear sectional diagrams as well as illustrations of special door applications.

Need *MORE* Compressor Capacity?

An ARMSTRONG *FOUL GAS PURGER* will help you get it!

HERE'S HOW:

AIR and non-condensable gases increase head pressure, and can reduce compressor capacity considerably. Armstrong Purgers *reduce* head pressure by removing all air and non-condensable gases. For every 4 pounds reduction in head pressure capacity is increased 1%.

Here are typical Armstrong Purger results:

- Head pressure decreased 80 lbs. at West Coast packing plant. Compressor capacity increased 20%.
- Head pressure cut 20 lbs. at southern nut and chocolate company. Compressor capacity increased 5%.

Capacity increase is only one advantage of purging with an Armstrong Foul Gas Purger. Learn about the other advantages — send for: *Free Bulletin No. 2211.*

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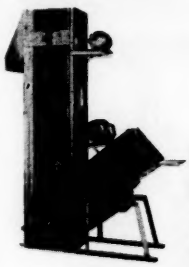
BATEMAN EQUIPMENT SAVES TIME and LABOR

BATEMAN SHAKER-SIZER

One man can keep unit in operation bagging and loading magazine.

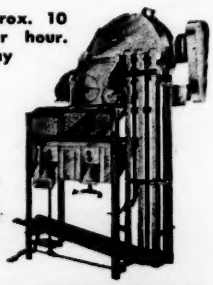


BATEMAN ELEVATOR

will deliver approx. 10 tons of ice per hour. Works with any Crusher.

BATEMAN LOADER-CRUSHER

Crusher ice unit saves time and labor costs. One man can do work of two. Storage bin under crusher will hold 100-lbs. of ice.



Bateman Ice Processing Equipment

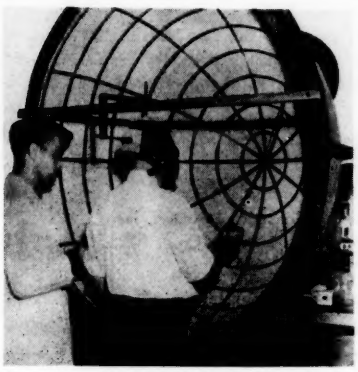
SEE YOUR DEALER or WRITE FOR INFORMATION

Mineral Wells, Texas

Bulletin on Gas Mask Vision

AS A help to buyers of gas masks, Acme Protection Equipment Company, South Haven, Michigan, is offering a special test bulletin which presents the comparative maximum usable vision patterns of leading makes of gas mask equipment.

The source material for this bulletin,



Vision scope used for checking vision angles

it is stated, is test data obtained through the use of a Vision Scope (shown in the accompanying photograph) which accurately checks all ranges of vision angles for both single and double-lens types of gas masks.

A copy of this Bulletin will be sent upon request to Protection Equipment Company, 1297 Kalamazoo Street, South Haven, Mich.

Tubular Products Bulletin

ENGINEERS and others involved with the design of modern process equipment involving the use of tubing will be interested in a new six page folder recently released by the Tubular Products Division of The Babcock & Wilcox Company. This bulletin, known as TB-357, provides information pertaining to tubular products intended for sub-zero temperature applications. Copies of the folder can be obtained, free on request to the division's sales offices in Beaver Falls, Pa.

The Tubular Products Division, with plants at Beaver Falls, Pa., Alliance, Ohio, and Milwaukee, Wis., manufactures seamless and welded tubular products in carbon, alloy, and stainless steel for all types of pressure and mechanical applications, as well as seamless welding fittings.

Bulletin on Fire-Ban

FIRE-BAN, the fire retardant surface coating for wall and ceiling application over insulation materials, is described in Bulletin 55, just issued by E. H. O'Neill Floors Co., Cicero, Ill. Fire-Ban is widely used in refrigeration plants. The Bulletin is available upon request from E. H. O'Neill Floors Co., 2525 South 50th Ave., Cicero 50, Ill.

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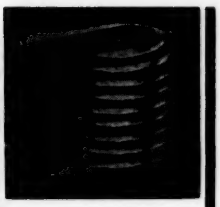
PIPE BENDS & COILS



The "know-how" of nearly 40 years of specialization in pipe fabrication back every job produced by our master metalworkers. You can confidently entrust your work to us. . . even stainless steel, or up to 6-inch extra heavy. Complete welding facilities.

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All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings; $15.00 per inch for nine listings.

USED EQUIPMENT—wanted & for sale

WANTED — 200 to 300 used ice cans, 11" x 22" x 60" I.D. Must be in good condition. National Ice & Fuel Corp., 38 S. Dearborn St., Chicago 3, Ill.

FOR SALE — 5x5, 8x8, 9x9 Yorks. 4x4, 5x5 Fricks. One 15 ton York Freon compressor 20" x 7' receiver. Write E. Niebling, 1546 St. Clair Ave., Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE — 1 U.S. Hoffman air blower 300 CFM direct connected 5 h.p. motor, 3600 r.p.m.; good as new. 3 Vertical 5 h.p. motors, good running condition. 1 Gifford Wood 300 lb. scoring machine, good running condition. 1 — 9x9 Frick compressor, belt connected 75 h.p. motor with starter and unloader. Carlisle Hygienic Ice Company, P.O. Box 282, Carlisle, Penna. Telephone 735.

FOR SALE

1 — 12"x12" 4 cyl. late Frick compressor.
1 — 11"x13" 2 cyl. York direct conn. syn. motor.
3 — 10"x10" 2 cyl. York direct conn. syn. motor.
2 — 9"x9" — 2 cyl. York direct conn. syn. motor.
1 — 7"x7" — 2 cyl. Frick direct conn. syn. motor.
1 — 7½"x7½" 2 cyl. York V. flywheel comp.
1 — 6"x6" — 2 cyl. Frick flat flywheel comp.
1 — 5"x5" — 2 cyl. Frick V. flywheel compressor.
3 — 9¼"x14" 115 h.p. Wolverine Diesel engine.
1 — 8 ton Niagara Evap. condenser.
11x22x47" and 11x22x51" ice cans.
Ice Plants — 20 to 100 tons.

ENTERPRISE EQUIPMENT CORPORATION
77 Alexander St. Yonkers, N.Y.
Cable: ENEQCO Phone: Yonkers 8-8118

FOR SALE

10x10 York 100 h.p. syn. motor.
9x9 York V-belt drive to 75 h.p. motor.
8x8 Frick V-belt drive to 50 h.p. motor.
3¾ x 3 6-cyl. York 25 h.p. motor.
100 h.p. Unaflow steam engine.
130 h.p. Superior Diesel engine 600 r.p.m.
Type 100 F & E cuber.
Brine coolers — condensers — ice breakers.

JOHN F. CARSON
"A" & Venango Sts. Philadelphia 34, Pa.
GArfield 62221

FOR SALE — Refrigeration equipment; ice equipment; new, used. Advise us your needs. Use "QUICKSEAL" — stops brine tank leaks; easy, efficient, economical. Born Company 80 East Jackson Boulevard, Chicago 4, Illinois. WAbash 2-3299.

FOR SALE — 1344 feet of FINNED PIPE — 12' lengths. Made from 2" pipe — 7" fins — 1½" apart. All heavily galvanized. NEW at half price. Also 150 steel hand trucks — roller bearing wheels. $6.00 each new. West Side Cold Storage Co. 7 Harrison St., New York 13, N.Y.

ICE PLANTS—for sale

FOR SALE — 40 ton ice plant. Brick building, grocery drive-in, thoroughfare, corner; located Houston, Texas. Now operating; selling account sickness. O. W. Fordyce, 1213 Capitol Ave., Houston 2, Texas.

Use a CLASSIFIED AD
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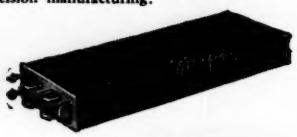
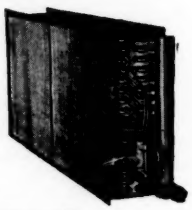


Coils and Bends of any metal or design engineered to your requirements. Send us your problems for engineering assistance.



A request on your letterhead will bring free copy of new Engineering Data Book on Pipe and Fin Coils.

REMPE COMPANY

348 N. Sacramento Blvd., Chicago 12, Ill.

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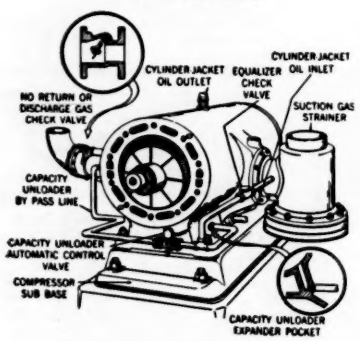
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1926
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Low Temperature Freezing Equipment

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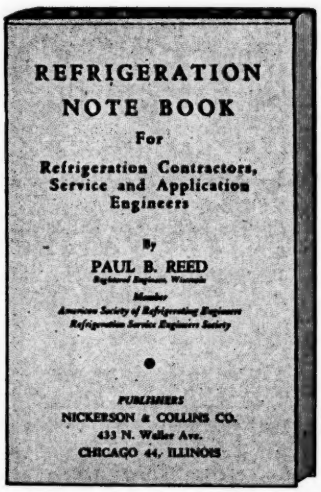
by PAUL B. REED



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204 Pages—Flexible Binding

THIS NOTE BOOK of condensed refrigeration information represents many years of work in accumulating practical data—"culling out" all extraneous material—so as the author states, "the reader will find a handy and easily carried source of information not usually kept in memory."

You will be surprised at the wealth of material that has been included in this convenient and practical reference Note Book. It is written in layman's language, without complicated formulas. In short, it is a tool responsible for the operation of refrigeration equipment.

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"Five years' trouble-free service at -20°F proves FIBERGLAS best"

says Anthony T. Rossi, President of Fruit Industries, Inc.

Fruit Industries, Inc.

P. O. Box 338 Phone 3-0951
Bradenton, Florida

November 18, 1958

Owens-Corning Fiberglas Corporation
National Bank Building
Toledo 1, Ohio

attention of Mr. Allen H. Cox
Manager of Low Temperature
Insulation Sales

Dear Sirs:

Thanks for your help on the insulation of our new freezer facilities at Bradenton. With the frozen orange juice business growing fast, it was important that Fruit Industries get its expanded facilities in operation as soon as possible.

Of course, there was never any doubt about what insulating material we were going to use in our expansion program. We knew from our own experience that Fiberglas makes a really trouble-free insulation. As far as we are concerned, Fiberglas is the best inorganic insulation for close temperature control and low operating costs.

Some time ago we installed several million feet of Fiberglas AE and AP boards at our Bradenton plant, where we maintain a temperature of -20F. The excellent service of that material, over a period of five years, gave us good reason to choose Fiberglas insulation exclusively for our new facilities.

We appreciate the excellent cooperation we have been getting from your Florida Branch and Toledo personnel on service and engineering.

Sincerely yours,

FRUIT INDUSTRIES, Inc.

Anthony T. Rossi
President

atr-s

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Mr. Rossi had experience on his side when he specified Fiberglas Insulation exclusively for the new freezer facilities of Fruit Industries, Inc. The record showed five years of excellent service from several million feet of Fiberglas AE Board in the company's Bradenton, Florida, plant.

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- *composed of inorganic glass wool sheathed in asphalt to better withstand widely varied conditions of moisture and temperature.*
- *durable under severe conditions, cuts maintenance.*
- *requires less thickness, makes more storage space available.*
- *helps reduce operating costs because of higher thermal insulating efficiency.*

Look further into the proven advantages of Fiberglas Low-Temperature Insulation. Send coupon today.

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Owens-Corning Fiberglas Corporation
Dept. 165-A, Toledo 1, Ohio

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☐ "PF Design Details"
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